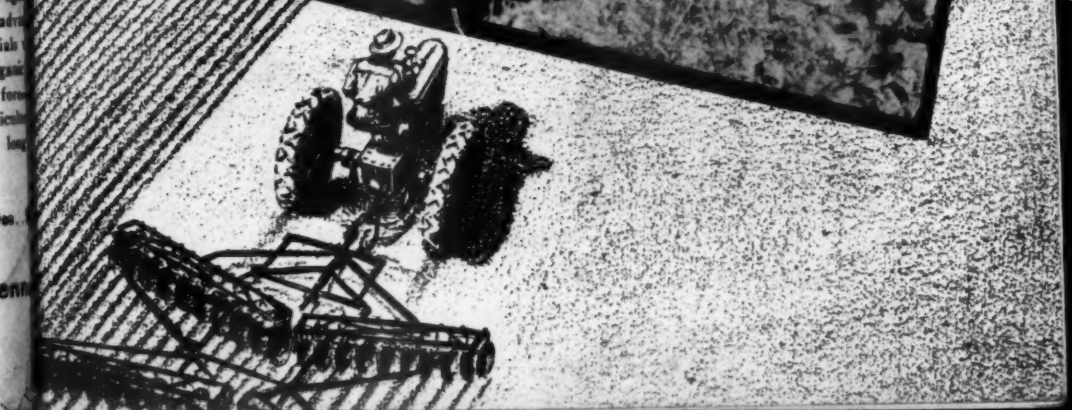
1/2

THE ORGANIC FARMER

SEPT. 1949
25 CENTS

FARMING WITHOUT THE USE OF COMMERCIAL FERTILIZERS

LIBRARY
CURRENT SERIAL RECORD
OCT 11 1949



Books for Organic Farmers

DEMONSTRATING THE ORGANIC METHOD

Farmers of 40 Centuries

by F. H. KING, D.Sc.

IN their successful endeavors to make the earth yield richly, the sprawling millions of China have many interesting lessons to teach us on the highest arts of agronomy. Compost, and compost only, is the key to the problem of sustaining the fertility of the East—an East to which chemical revivification of farmlands has never penetrated. Dr. King here reveals the East's secrets of keeping the soil healthy. 384 *pp.* 209 *photographs.* $5.00

The Earth's Green Carpet

by LOUISE E. HOWARD

THE earth's green carpet can be kept flourishing only when we realize the importance of returning to the soil all plant and animal residues to serve as foods for the soil organisms. Only a living soil is productive and capable of growing plants which are relatively free from diseases and pests—plants which nourish a healthy and happy population. Lady Howard, widow of the late Sir Albert Howard, writes on life's cycle studied as a whole. 200 *pp.* $3.00

The Organic Front

by J. I. RODALE

HUMUS is the spirit of the soil; it grows whole plants and healthy people. The author presents abundant evidence of how quickly plants show abnormalities and deficiencies as the result of poor cultural practices or deficient soils, and outlines the fundamental principles which underlie successful farming and gardening. Chapters on compost, chemical fertilizers, and diet. 200 *pp.* $2.50

Order from

THE ORGANIC FARMER

DEPT. OF-9B EMMAUS, PA.

Send for Complete Catalog of Farming and Gardening Books

Your Own ODORLESS FERTILIZER FACTORY

Compost garbage and all sorts of waste materials without odor. Use even sawdust and chaff. Easy way to build rich soil and grow better fruit and crops.

Now, with *ActivO*, it is possible (without chemicals) to make your own rich fertilizer—better than manure; better than you can buy—from garbage and other such materials . . . without odor. And make it QUICKLY. EASILY. CHEAPLY.

It is possible to reduce garbage to humus in 2 to 6 weeks! You may do it in an open heap, or in compost box or cabinet—even in basement or garage!

The "secret" is ActivO, a remarkable bacterial discovery which contains billions of the friendly, desirable bacteria that Nature herself uses to change waste into humus and rich plant food. You merely bring the waste materials together and sprinkle on ActivO. No skill required. Start a compost any month of year. Use any sort of vegetable or animal waste.

Low Cost: A little ActivO goes a long way—No. 25 size treats up to 3 tons of waste. With ActivO you can make fertilizer even from corncobs and sawdust, yet ActivO will not destroy earthworms or other beneficial soil agencies—for using ActivO is only using *Nature*, greatly intensified.

Only ActivO will do all this. Never before a product like it! But aiding compost-making is not the only way ActivO helps you grow more and better fruit and field crops, prettier flowers, tastier and more healthful vegetables, thick-turf lawns. You don't need to buy special "soil activators." APPLIED DIRECT TO SOIL ActivO conditions, fortifies and activates it; gives *life* to jaded soils—adds both the helpful organisms and many minerals, humus and nutrients for which most soil is starved . . . ACTIVO ALSO REDUCES ODORS IN OUTDOOR TOILETS WHILE TURNING WASTE INTO EASILY HANDLED, ASH-LIKE FERTILIZER.

You will want to try this unusual product. Get some ActivO *today*. If your regular dealer doesn't have it, use coupon below. *Don't* accept substitutes! There's only ONE *ActivO*—only one organic, bacterial product like this. Insist on *"Act-tive-Oh!"*

GIVEN **Special Premium Award** At no extra charge, with each order for a No. 25 size ActivO ($6.79) which treats up to 3 tons of compost, we shall be happy to mail you PLANS for building the **A-1 Composter Cabinet** like picture—drawings with list of materials and instructions. Both ActivO and plans prepaid. An ingenious way to turn garbage and waste disposal into garden profit. Odorless, continuous process.

Check here ☐ If you want plans and No. 25 ActivO at $6.79 in stores, $6.99 ppd. 300 miles

MAIL TO → BENSON-MACLEAN PLANT PRODUCTS, Bridgeton, 22, Ind.
(Northeastern states, address ActivO-SOILSERVICE, Box 131, Townsend, Mass.)

Inclosed is ..... for $ ..... Send the following:

☐ No. 7 size, for 1700 lb. compost, at $2.00 ea. prepaid.

☐ No. 50 size, for 6½ tons, at $11.95 each (with free plans) frt. or exp. collect

NAME .....

ADDRESS .....

P. O. and State .....

Dealer's Name .....

And Address .....

☐ FREE literature; ActivO and composting.

SHIPPING POINT If different from P. O.

MORE THAN A COMPOST HASTENER!

Organic-Bacterial ACTIVO

In Canada write ActO Plant Products Co., Ltd., 218 Front St., E., Toronto, Ont.

VOL. 1, NUMBER 2 SEPTEMBER, 1949

THE ORGANIC FARMER

Editor—J. I. Rodale Managing Editor—Robert D. Rodale
Associate Editor—Dr. Wm. H. Eyster

TABLE OF CONTENTS

From Readers		3
Editorial	J. I. Rodale	9
Composting Corn Cobs	J. I. Rodale	10
Sewage a National Resource	Daniel W. Levandowsky	11
What About DDT?	Dr. William H. Eyster	19
A Perfect Score Growing Chicks	Raymond Greenbaum	23
Mexico Has Agricultural Troubles	Robert Rodlae	26
Kale as a Cover Crop	C. M. Cleaver	29
Farm Compost in Production	J. Van Clute	31
Artificial Insemination Failure Sells More Bulls		35
Straw Gives Life to Soil	Thomas E. Johnston	36
Hedges Control Soil	A. R. Penfold	38
Harvesting Sunflowers	Robert Rodale	39
Pasture Your Flock	Thomas E. Johnston	41
Overtillage Destroys Fertility	J. I. Rodale	43
Mulches		44
Memos to Farmers		46
Killing the Soil	Hugh V. Corley	48
Starland Farm Goes Organic	Alden Stahr	49
Composting Corn Cobs	J. I. Rodale	10
How Lime Paid Off		55
Yarbs Are Organic	Alden Stahr	56
Livestock		59
Poultry		61
Scoop Used to Move Manure		62

Published monthly by ORGANIC GARDENING. Publication, Executive, Editorial, Subscription and Advertising Offices: 6th and Minor Streets Emmaus, Pa. Subscription Rates, United States and Possessions, One Year $3.00, Two Years $5.00, Three Years $6.00. Application for entry as second class matter is pending.

use rich... Hyper-Humus

To Speed Growth of Seedlings . . .
To Help Prevent Damping Off

Hyper-Humus

Ask your Dealer for quotations

No Shipments to Far West

Growers of Tobacco and tomato plants and other seedlings find Hyper-Humus invaluable in the seedbeds.

Also valuable to assure safe transplanting. Mix it with the soil to encourage root-growth.

Many also use it instead of soil in the compost heap, where it aids breakdown of materials and improves the final product.

Write for illustrated folder

HYPER-HUMUS COMPANY, Box 19F, NEWTON, N. J.

From Readers....

Moulding Sunflowers

Dear Sir:

I have been growing sunflowers for the last two years. Last fall I had four or five hundred good heads of seeds. I put them in the barn to dry, but when I came to take the seeds out, I found that they had all moulded and rotted and that I could not use them. I would be very pleased if you could tell me when to harvest sunflower seeds and how to extract the seeds from the head, as I want to be eating some seeds this winter.

E. C. Leathers,
Bowdoin, Maine

Ed. The article "Harvesting Sunflowers" on page 39 explains the method used on the Organic Experimental Farm.

Organic Citrus Wins Sweepstakes

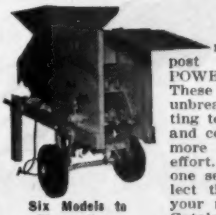
Dear Sir:

Try these organically grown Valencia oranges of ours which won First, Second and Third Premium Awards for Valencia oranges in the producers division at the Orange County Fair. We were also awarded First Premium "Citrus Sweepstakes Award" for total points won in the citrus division. Other awards were First for Eureka lemons, First for Bearass limes and Second for Naval oranges (these were of the same crop ripe last December and January).

Dr. A. P. Koentopp,
Santa Ana, Calif.

Ed. Our office staff said the oranges were the finest they had ever tasted.

Greater Yield
Healthy, Sturdy Plants



Six Models to Choose From

. . result when you use the richer, smoother moisture-retaining compost mixed by a KEMP POWER SOIL SHREDDER. These sturdy machines, with unbreakable spring steel cutting teeth, mix soils, manure and compost 90% faster and more thoroughly with little effort. Pay for themselves in one season! Write now! Select the machine that suits your needs from the KEMP Catalog.

Priced from $100.

50 Years' Experience Manufacturing Soil Shredding Machines

KEMP MANUFACTURING CO.

Dept. 6 1027 E. 20th St. Erie, Pa.

Orlyt GREENHOUSE $425

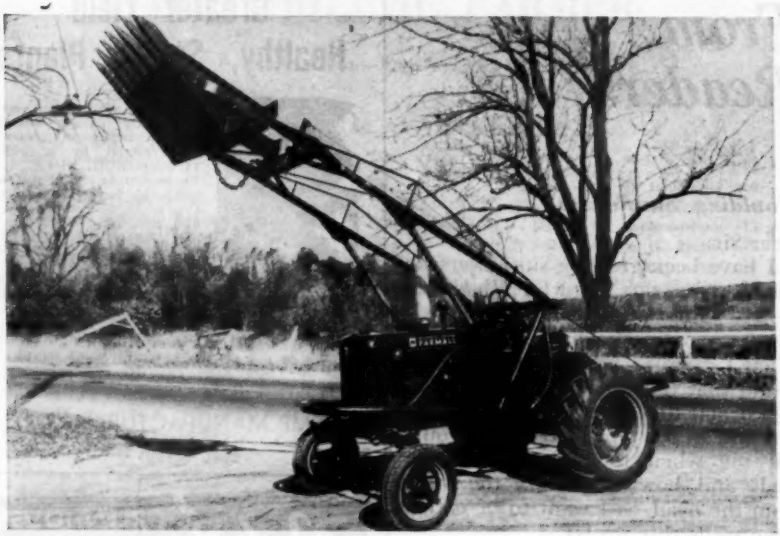
Flowers throughout the winter, seedings by the thousand to set out in your garden. It is easy with Orlyt. Comes in sections that go together with bolts and screws. Easy to put up, anywhere, anytime. $425 buys the 10 by 11 ft. Orlyt pictured ready to go on your foundation. Other basic Orlyt models from $190 and longer models for the farm. Ask for booklet No. 32 and state if wanted for home or business.

LORD & BURNHAM
IRVINGTON, N. Y. DES PLAINES, ILL.

EARTHWORMS
Need *WEEDS and WASTE*
to make into plant food.
Build your garden by putting EARTHWORMS to work
1500 Earthworms (1½ gal. Culture) starts a small compost—$15.00. Free sample of Earthworm plant food with each $15.00 order.
Free counciling with Bernice Warner
OHIO EARTHWORM FARM
Dept. X-1 Worthington, Ohio

DINGLEY HYDRAULIC LOADER

MECHANIZES THE COMPOST HEAP



Attaches to tractors for use as a manure loader. Can handle all kinds of organic matter. Reduces the time of making compost to a fraction. No organic farm should be without one. For Farmall A, Super A, B, Bn and C. John Deere M and M.T. Also old model H.

A HEAVY DUTY LINE FOR LARGE TRACTORS

Available for most makes of cultivating type tractors, some wide front types and the new John Deere Crawler.

A Full Line of Attachments

Manufactured by

DINGLEY MANUFACTURING CO.

880 WEST CENTRAL ST.,
FRANKLIN, MASS.

English Terms Puzzle Reader

Dear Sir:

The August number of "The ORGANIC FARMER" was very interesting. However, the article by E. B. Balfour is somewhat confusing and should have been clarified for American readers. Terms such as "deep rooting ley, ploughed in mustard crop, arable, root crop, muck," etc. take too much of the average reader's time to figure out.

F. W. Smith,
Pittsburgh, Pa.

Ed. Deep rooting ley– a semi-permanent pasture made up of deep rooted plants, like alfalfa. Ploughed in mustard crop–a green manure crop belonging to the mustard family (kale). Arable land is land suitable for growing crops. Carrots, beets and turnips are root crops. Muck is the English term for manure.

Abused Farm Switches To Organic Methods

Dear Sir:

I am the unproud owner of a badly abused twenty-eight acre farm. For the past three years I have implicity followed my County Agent's instructions as to fertilizing the land with chemicals and so on.... all with the most negative results. The soil is in very poor condition, we do not have enough water for adequate watering and I have spent hundreds of dollars for fertilizers.

It seems to me that Organic Farming methods are my only hope for keeping this farm out of the Tobacco Road class.

Mrs. Henry H. Ogden,
Chamblee, Georgia

Farm Visitor Notices Lack of Odors

Dear Sir:

My trip to the Organic Experimental Farm was full of surprises. My first

TOP SOIL

More valuable than gold!
Without it you could not exist.

During the Fall, nature provides the material for top soil in leaves and vegetable matter. Use these for making compost.

In making compost use **EARTHWORMS** to turn it, as they add extra nutriments for your soil.

Thru enlarged facilities we now can supply **EARTHWORMS** at prices within everyone's reach.

To help you we are giving FREE books with each order.

1000 EARTHWORMS **$4.95**
(Free book "Our Friend the Earthworm")
500 EARTHWORMS **2.95**
(Free book "Compost, How to Make It")

Full instructions with each order.

ORGANIC GARDENS
Perry Hall, **Fullerton, Md.**

3 Generations of
FARMER USERS and THEIR FARMS TESTIFY TO THE VALUE OF
RUHM'S PHOSPHATE ROCK
Non-acidulated Plant Food

recommended by ORGANIC GARDENING. Increases yields, improves quality of all crops. Quick results, long lasting effectiveness at low cost. For full information write

SOILSERVICE, Townsend, Mass.
BRYAN & SHEFFER, Portland, Ind.
AUSTIN FEED & SEED CO., Chattanooga, Tenn.
VAUGHAN'S SEED STORE, 601 W. Jackson Blvd., Chicago, Illinois

Order these three basic books by J. I. Rodale

STONE MULCHING
IN THE GARDEN

STONE MULCHING, an ancient method of gardening and orcharding, was accidentally rediscovered when stones were piled around a hemlock tree to get them out of the way. The tree thus mulched grew vigorously, while others died! Equally remarkable results have been obtained by stone-mulching vegetables, crop trees, and ornamental plants. This 168-page book details methods and results. Stone-mulched plants are early, vigorous, and relatively free from diseases and pests. This sensational but natural practice obviates such chores as digging, cultivating, hoeing, and weeding. Here is the most remarkable and promising cultural practice proposed in recent years.

50 photos. Cloth. **$3.00**

A best-seller:

PAY DIRT

NEXT TO THE Atom Bomb, nothing else in the world is so serious as Man's ravishment of the earth that sustains him and keeps him from starvation. PAY DIRT points the way to proper farming and gardening methods and is guaranteed to "give a case of the jitters to all back-yard gardeners as well as..... farmers who have been playing it the easy way by using chemical fertilizers."—*The New Yorker.* PAY-DIRT shows how the individual gardener can obtain bigger yields of disease-free plants, rich in health-giving qualities. A natural for everyone who wants to adopt Organic Gardening methods.

Cloth. **$3.00**

They're cancer-free:

THE HEALTHY HUNZAS

A BOOK about the inhabitants of the northwestern section of India who are astoundingly healthy because of the way they raise their food. A race of over 22,000 people, the Hunzas possess a bodily buoyancy that makes them utterly unique in the roster of the world's national groups. This book should revise our conception of nutrition. Full details show how any gardener or farmer can apply the Hunza methods. "An interesting story with a vital lesson."—*Los Angeles Times.*

20 full-page illustrations. **$3.00**

ORGANIC FARMER, Dept. OF9D, EMMAUS, PA.

Please mention THE ORGANIC FARMER when answering ads.

surprise was when I encountered no odor at the compost heap. Again I was surprised when there was no odor at the garbage pit, and I was still more surprised when there was no odor in the chicken house. For all this you had a ready explanation, but I'm really at a loss to understand how a pig pen can be kept odorless. Please tell me how you do it.

Robert R. Burton,
Falls Church, Va.

Ed. Allow your manure to accumulate on the barn floor. It will soon accumulate the odor-killing bacteria that populate the compost heap.

Poultry Disease Spreading to Humans

NEWCASTLE disease, a serious poultry sickness, appears to be spreading to human beings, the American Veterinary Medical Association warned. In human cases, the eyes, nervous system and respiratory tract are affected.

The malady, which was first detected in 1926, is now known wherever chickens are raised. Its principal manifestations in poultry are a high death-rate among young chicks and sharp reduction in laying rate among mature fowl. Vaccines are the principal means of combating it.

Science News Letter, August 13, 1949

if you are interested in learning to write, *or* want books on vocabulary-building or word-finding, send for our catalogue.

RODALE PRESS, BOX O. G.
EMMAUS, PENNSYLVANIA

Schiff Bio-Brand

2 *NEW ORGANIC FARMER AIDS* 2

BIORG

***THE SENSATIONALLY NEW* COMPOST ACTIVATOR**

A live yeast fungus with added soil bacteria capable of excreting enzyme activators. The yeast fungus contained in BIORG is a growing live colony that multiplies converting crude carbohydrates into soluble sugars and other products of decomposition.

ONE OZ. will start the activation of the average size compost pile. The LIVE cells grow and continue to grow as they feed and multiply on the carbohydrates. Activity of BIORG continues indefinitely except in very cold freezing weather. HERE'S ALL YOU DO: Dissolve BIORG in water, and sprinkle on the pile as directed.

TRIAL SIZE 8 applications **fresh dated** $1.00 postpaid anywhere. Large users please request bulk prices.

ORDER BIORG TODAY AND START USING IT AT ONCE.

AT LAST!

GROWFAX

A CONCENTRATED Worm Food

That's right: concentrated. It contains 35% PROTEIN . . . PLUS

The average worm food sold is mainly loam or decayed leaf with little or no analysis of protein content. When diluted 1 to 100, it is still richer than most common unfortified mesh because it contains

REPRODUCTION factor 'E' ENERGY SUGAR—as dried molasses—**A. P. F.**—Animal protein GROWTH factor Plus minerals and vitamins from yeast.

DILUTE 1 to 100

Dilute with loam, humus, decayed ground leaves, grass or use it for FORTIFYING THE WORM FOOD you may be using now.

REMEMBER! NO OTHER COMMERCIAL PRODUCT OF THIS EXACT NATURE HAS EVER BEEN OFFERED: GROWTH FACTOR, REPRODUCTIVE FACTOR, AND MOISTURE RETAINING FACTOR.

1 lb. Jar $1.00 — 5 lb. $3.00 postpaid.

Schiff Bio FOOD PRODUCTS

ORGANIC SOIL FOOD DIV.
80 Montgomery St. Jersey City, N. J.

Now . . . Everybody Can Afford Complete, Powered Garden Equipment!

Handy-Worker Production Techniques and Advanced Engineering bring *powered* home and garden implements within the reach of Everyone! Now you can purchase a Handy-Worker Tractor and all the garden implements you need as a "package" at a fraction of the cost of individual purchases, and at a tremendous saving of storage space.

Handy-Worker Rotary Tiller

Now with 2 HP Engine . . . and still only **$194.50***

Comes to you as a combination 2 HP Tractor and Rotary Soil Tiller. Conditions soil in one operation. Cultivates and weeds throughout entire growing cycle of plant. Loosens and aerates soil to desired depth from 1 to 5 inches. *Mixes* fertilizer and compost *in* instead of merely turning it over.

Handy-Worker, Jr. Tractor

1½ HP Engine and patented "safety" clutch **$129.50***

Features a chassis of rust-proof, non-corroding aircraft strength aluminum alloy. Weighs only 80 lbs. A child can operate it. Advanced Handy-Worker engineering brings you FOUR points of power take-off. Plus a patented, overriding "safety" clutch permitting free wheeling forward and reverse.

LOW PRICED ATTACHMENTS, TOO

Attachments secured in a jiffy. Power Take-Off $34.50*. 21½" Power Mower $79.50*. Air Compressor $49.50*. Lawn and Garden Sprayer $65.00*. 32" Sickle-Bar Mower $79.50*. Pneumatic Tree Pruner $54.50*. Rotary Snow Plow $94.50*.

All you do is insert a coupling pin and you're ready to go! Lawn Mower Converter Bracket $4.50*. 21½" Power Mower $55.00*. Air Compressor $49.50*. "Dozer" $12.50*. Cultivator $13.50*. 28" Sickle-Bar Mower $45.00*. Pneumatic Tree Pruner $54.50*.

Handy-Worker

America's "FIRST" Low-priced Garden Implements!

*F. O. B. Factory

Write for literature • Rolle Manufacturing Co., Inc., Lansdale, Pennsylvania

Editorial

THE field of organic farming is wide open for money-making opportunities and at this stage, premiums can easily be obtained for practically all farm products, for the reason that a health conscious public realizes that food containing more vitamins and minerals is worth more. Not that it costs more to produce. Actually the organic method is cheaper than where the chemical method is followed because of the elimination of the cost of the chemicals and much of the poison spray.

On the typical 100 acre farm, where there is a strong urge to pile organic matter into the soil, it is surprising how much spare time can be found to seek out organic materials and to make compost. And using a manure loader device attached to the tractor, the time of making compost is reduced tremendously. With a manure loader one can no longer call the organic method hard work, and a good loader costs less than four hundred dollars. It can be used for cleaning snow from driveways, and handling many other kinds of materials on a farm.

Therefore much of the cost of the organic method does not entail an actual outlay of money. It means simply that the farmer spends that much in making compost for which he is being reimbursed in the selling price of his product.

In the organic method, the farmer should study out the situation, and decide upon crops that will give him the most income. Part of his program should be crops that can sell by mail-order, for more money can be realized that way. Mail order buyers can be reached in four ways:

1. By advertising in *Organic Gardening Magazine.*

2. By getting a listing in our organic food directory which it is hoped will in a few years have a distribution of a million copies.

3. By advertising in local newspapers.

4. By advertising in health magazines.

Wheat is the easiest product to sell by mail, but it should not be sprayed with cyanogen gas in the barn. If handled aggressively, your supply should be sold out in a few months. People should do more baking of bread and making their own breakfast food.

Sunflower seed is another easy seller by mail. Watch the columns of this magazine for desciption of how to plant and harvest this crop. It is an unusual health-giving food.

Don't overlook selling vegetables at a road-side stand at your farm. Satisfied customers, who will note a better taste in your vegetables, will keep coming back.

Organically grown potatoes would have an easy sale. Buyers who will be aware of their quality will come to your farm to buy them, saving you delivery cost.

Other products are ground corn meal, eggs and chickens where the birds are fed organically, rabbit meat, berries, milk, fruit, of all kinds (customers will mob you to get unsprayed fruit), buckwheat, and the usual run of farm products. Incidentally do not forget peanuts, because this is an organically produced food that keeps nicely over the winter, that is, if you have grown it by the organic method. They should not be roasted because that kills some of the vitamin content. Many persons do not know that peanuts will grow in the average temper-

ate region, especially if a lot of organic matter is used.

By growing all things organically you are freeing yourself of the competitive market. Sometimes with regard to certain vegetables, there are gluts and you cannot give the stuff away, but customers who are trained to eat organic food, will stick to you.

Get in touch with physicians and hospitals in your territory and give them literature to show the superior nutritional quality of your crops. Pediatricians (baby doctors) might send parents to your farm. Nothing is too good for babies.

We hope also that we will receive letters from organic farmers giving hints and ideas on how they have worked out special angles in the sale of organic foods. One helps the other. These letters will be reprinted in the *Organic Farmer*. The bell is going to ring any minute. Let's go!

J. I. RODALE

† COMPOSTING CORN COBS

By J. I. RODALE

CORN cobs are an excellent material for making compost, but they should be first cut up with an ensilage cutter or other machine that will break it down, otherwise it will take years for the material to compost. In the fall our men scour the countryside and accumulate large piles of leaves which during the year are used along with the corn cobs and weeds or spoiled hay, etc. and manure when we have it .

The cobs mixed with the leaves prevent the latter from caking and impeding aeration. We have found, after experience, that the corn cobs should be left to weather in the open for a few months. They will then break down much finer in the ensilage cutter. There is a tremendous difference and it results in much quicker and much finer compost.

Corn cobs are a valuable ingredient for the compost heap and should be carefully preserved, rather than burned up as many farmers do. Tests show that the cob, in nutrient value is equivalant to 2/3 that of the corn kernel. This is amazing when one considers how sinfully the cobs are gotten rid of.

If farmers will contact the mills in their community that shell corn they will find that they can get mountains of cobs merely for the hauling, and that that labor will repay them a hundred fold.

We have found that we can make excellent compost without the use of manure. In a large pit we assembled shredded corn cobs and leaves. One man on each side of the ensilage cutter fed in the materials which were blown into the compost pit direct from the cutter. The cobs were piled on one side of the cutter and the leaves on the other, thus both materials were automatically mixed in the pit.

Without the use of manure, we have to use earthworms, the kind that we breed. They work in this material, chewing it, impregnating it with their own manure, thus providing the animal matter. With the use of earthworms there is no need to turn the material. But an extremely large quantity of them will be needed.

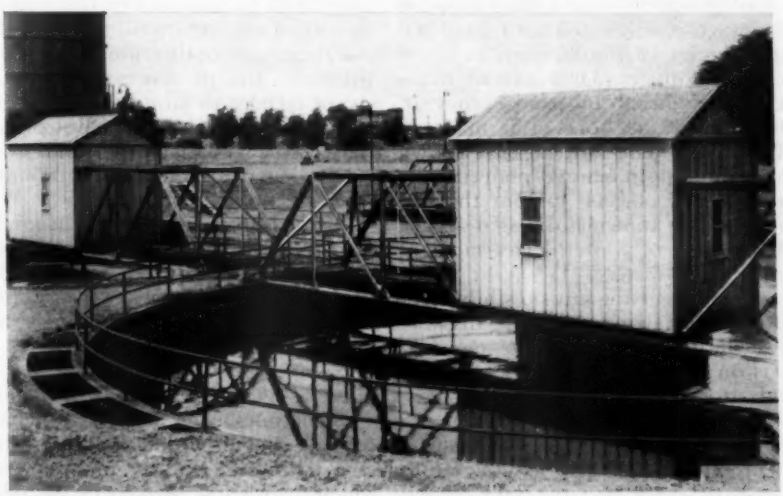
If the compost is always made on the same spot, with an earth bottom of course, the ground will become so rich with earthworms and their eggs, that as successive heaps are made less and less earthworms will be needed.

Sewage a National Resource

By DANIEL W. LEVANDOWSKY

CLOSE to 700,000 tons of nitrogen per year could be made available to farmers of the United States if all city sewage or rural human wastes were treated as efficiently as is done today in some communities here and abroad. The significance of this figure may be realized when it is compared with 888,000 tons of nitrogen—the total content of nitrogen in fertilizers used in this country in the fiscal year of 1947-48. And this after the considerable boost in production capacity of synthetic nitrogen for munitions during the war. Before the war, the average production of nitrogen for fertilizer for the years 1935 to 1939 (inclusive) was 371,000 tons per year.

In some cities in this country organic fertilizer is made from sewage treated by an all-activated sludge process. Ten pounds of nitrogen per capita per year is the rate of production. The rural wastes are treated today efficiently and on a large scale in some communities abroad, also yielding approximately ten lbs. of nitrogen per capita per year. Some of these methods are adaptable to conditions in this country. Ten pounds per capita per year in a country with 140 million people makes 700,000 tons of nitrogen per year. In addition, 350,000 tons of phosphorus (expressed as phosphoric acid) and 80,000 tons of potash, also the minor elements, hormones and



The sewage water flows first into these round settling tanks. Approximately 50 per cent of the suspended solids settle to the bottom as sludge.

A narrow-gauge railway carrys high grade sand into the sludge drying pens.

possibly as-yet-unknown useful elements can be recovereed. All this and between 20 to 30 million tons of organic matter to replace the manure, which tractors cannot produce.

Unfortunately only a small fraction of sewage is converted into fertilizer. Approximately 100,000 tons of dried activated sludge (5,000 tons of nitrogen) is produced and sold each year, 50,000 to 60,000 tons of it made in Milwaukee. The farmers have shown their interest in sewage materials by using yearly 500,000 tons of the low grade sludge known as digested sludge, the product of wasteful treatment of sewage.

Before discussing any possibilities of potential change-over from disposal to utilization, some of the essential facts on methods now in use must be understood.

Direct Discharge of Raw Sewage

Direct dumping of raw sewage into a body of water (a river, lake or sea) is an accepted method of disposal because when the sewage is sufficiently diluted with water a satisfactory process of oxidation and disintegration of the putrescible matter takes place. The organic compounds in the sewage are attacked by micro-organisms and are either mineralized or brought into a state of relative stability. Depending on the degree of dilution of the sewage in water, this process may or may not be of menace to sanitation and to survival of the aquatic life. But even in large streams the floating solids of the sewage tend to "hug the banks" until they are finally disintegated.

Because this method of disposal is cheap, it is widely used, even in many places where conditions warrant some improvement. As far as salvage of fertility values from sewage is concerned, this is a totally wasteful method.

The Primary Treatment of Sewage

Sometimes when the direct discharge of raw sludge becomes a serious menace to public health a partial treatment consisting of a primary settlement of the sewage is introduced. The sewage is allowed to remain usually

for a period of 2 hours in settlement tanks before it is discharged into the river. During this time approximately 50% of the suspended solids settle at the bottom of the tanks and form a sludge. This operation is usually preceded by the screening of large floating solids before the sewage enters the tank. Sand, gravel and other heavy matter also is separated in so-called grit chambers, before the settlement. While the sewage is in one process of settlement the floating solids which do not settle but form a scum on the surface of the quiescent liquid are separated. After such partial treatment, the sewage, now called "settled sewage," is discharged into the river.

Although it has lost half its suspended solids, the settled sewage still contains about six-sevenths of the total solids of the original raw sewage including about four-fifths of the organic solids. This is because city sewage also contains considerable matter in solution which cannot be captured by settlement. Although visibly inoffensive, the putrescible matter of the settled sewage creats troublesome conditions, often detectable through unpleasant odors of stale sewage.

More than two-thirds of the fertility values are lost to the sea by way of settled sewage.

From 2 to 5 gallons of raw primary sludge settle to the bottom of the settlement tank from each 1,000 gallons of sewage. The moisture content of the primary sludge is between 90% and 96%. From 100 to 150 gallons of primary sludge are produced per capita per year. On a dry weight basis raw primary sludge contains from 65% to 80% organic matter, about 3% nitrogen, 1½% phosphorus and 0.5% potassium.

The accepted method of treating the primary sludge is to subject it to

The sand is spread out before the sediment carrying water is allowed to flow in.

anaerobic decomposition—an airless putrescence process in closed digestion tanks. After 30 to 40 days of anaerobic digestion about one half of the organic matter, representing the readily putrescible fraction, is disintegrated. About two-thirds of the nitrogen in the form of ammonia carbonate and three-fourths of the phosphorus contained in original raw sludge are lost in this process. They go into solution with so-called "dirty water", the supernatant liquid formed in the process of fermentation. The "dirty water" is disposed of by pumping it into the effluent with the "settled sewage".

In the process of digestion a fuel gas is produced. In some disposal plants this gas is used for running the machinery. In others it is burned or is allowed to escape.

Digested sludge is a fairly stable but worthless product. Sometimes the digestion is not perfect and in these cases the sludge emanates obnoxious smells for quite some time. It is not entirely sanitary, especially if it is not heat-dried. Some spores of pathogenes (Disease organisms) are still present. The fertility value of digested sludge is low because it contains a high percentage (50 to 60%) of inert mineral matter. The nitrogen content is between 1% and 2% and is of low availability. Phosphorus is usually around 1% and potash below ½%. Digested sludge is the material known to many as just "sewage sludge" and is usually obtainable free for the hauling. The fertilizer industry uses about 50,000 tons of digested sludge annually as an inert filler.

The bulk of digested sludge produced in this country, for lack of demand, is usually dumped or buried in out of the way places or city dumps.

Secondary Treatment of Sewage

With growth of cities the primary treatment alone has often become grossly inadequate. Many municipalities have been forced to adopt some sort of secondary purification of sewage, of which there are several types varying in their efficiency and adaptability to given conditions.

The representative types of secondary treatment are the following: (1) chemical precipitation, (which can also be considered as an improved primary treatment) (2) trickling filters, (3) activated sludge process.

(1) *Chemical precipitation*

Coagulants such as ferric chloride, ferric sulphate and alum are used together with lime to promote flocculation of the suspended solids in sewage. Up to 90% of the suspended solids are settled out, including fine material which will not settle in the ordinary settling procedure.

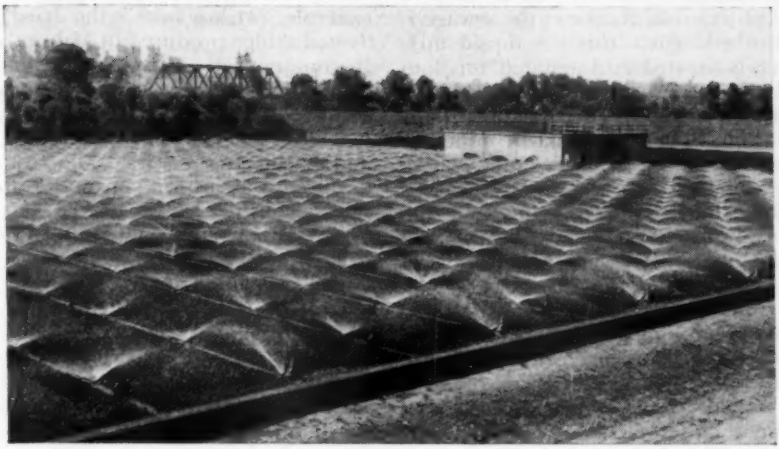
No preliminary sedimentation is required in this method. Instead, the raw sewage goes through a flash mixer, where the chemicals are added to it, and then it enters a flocculator, a tank supplied with slowly rotating paddles where the suspended solids go through the process of coagulation. Then the flocculated sewage passes into a settling tank also known as a clarifier, where the settlement occurs.

The amount of sludge in the chemical precipitation process is usually double the amount settled out in the primary sedimentation method. However the amount of soluble solids in "settled" sewage remains the same. No satisfactory method has been developed to reduce the soluble putrescible matter through the addition of chemicals. Chlorine is often added to chemically settled sewage effluent. It temporarily disinfects the sewage by killing or inhibiting the micro-organisms. However, this is only a postponement of the putrescence which takes place as soon as the effects of the chlorine wear out.

The chemically precipitated sludge is digested in anaerobic digestion tanks in the same manner as the ordinary sludge.

(2) *Trickling filters*

There are several kinds of trickling filters working on somewhat different principles. We will take up the stand-



Aerating of the "settled sewage" in these trickling filters hastens bacterial action and oxidation of putrescible matter.

ard type, which consists of a crushed-stone or gravel bed about 7 feet deep with drainage tiles at the bottom. Stationary or rotating sprinklers spray sewage ("settled sewage" in almost all cases) over the bed and it trickles over the surface of the rocks down to the bottom of the bed. The surface of the rocks is covered with a layer of microbial film. By the time the sewage reaches the bottom, considerable oxidation of the putrescible matter, aided by microbial growth on the gravel, takes place. About one-half of the putrescible matter remaining in the "settled sewage" is mineralized and stabilized by its passage through the trickling filter.

After leaving the trickling filter the sewage proceeds in a secondary settlement tank called a "humus tank" by sanitary engineers. A small amount of sludge ("called humus") settles off at the bottom of the tank and the supernatant sewage goes into the river. The amount of "humus" is so small that the tank is cleaned out usually only 2 to 4 times a year. The "humus" goes into anaerobic digestion together with the primary sludge.

This method is of very little value as far as saving of fertility values is concerned. Considerable nitrification takes place and the nitrates are lost in the effluent.

Large cities do not build trickling filter beds any more because they occupy large areas (about 10 acres for one million gallons per day). Also the purification efficiency of trickling filters is limited.

(3) *Activated sludge process*

At the present stage of sewage treatment technique the activated sludge process is the most efficient method of recovery of fertility values in sewages. The "setttled sewage" enters a series of elongated rectangular tanks usually 15 feet deep and 15 feet wide, which are provided with air diffusing devices at the bottom. The air bubbles aerate and agitate the sewage in the tank. A bacterial slimy flock, called activated sludge, is present in the tanks and it is being circulated together with sewage and is thoroughly mixed with it. The sewage solids both in suspended and dissolved state are being rapidly adsorbed* by the activated sludge. At

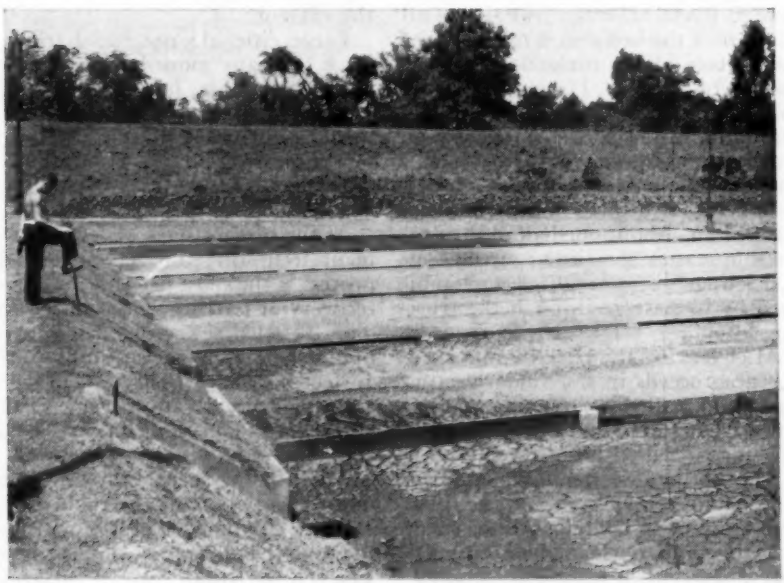
the end of 30 minutes up to 95% of all putrescible matter in the sewage is adsorbed. After this the liquid mixture is aerated and agitated for 4 to 6 hours longer while the adsorbed matter is being digested by the micro-organisms. Then the mixture proceeds to secondary settlement tanks, where in a matter of 2 to 3 hours the activated sludge is settled out and the clear liquid goes out as effluent.

About 80% of the activated sludge is returned to aeration tanks to be recirculated with a new batch of sewage. The remaining 20% is called "waste sludge" and in the great majority of cases this valuable fertilizer product is wasted. Usually it is subjected to anaerobic decomposition in digestion tanks. That is, when it is not burned or dumped in the sea or otherwise wastefully disposed of.

*Adsorbtion is a physical phenomenon of incorporation of matter into a colloidal mass.

These are exceptions, however. For example, "Milorganite", the dried activated sludge produced in Milwaukee. It contains 6% nitrogen, 3% phosphorous, 0.8% potash, plus 75% organic matter (including nitrogen). It is sold for $70 per ton retail in eastern and Pacific coast cities. The cost of drying it is about $25 per ton. A pretty good business!

At the same time, in some eastern cities huge quantities of activated sludge are hauled out to sea in specially built boats and barges. The cost of this dumping (if activated sludge is not mixed with other sludges) ranges anywhere from $15 to $50 per ton dry weight, depending on whether or not the sludge has been thickened, and on the methods of transportation. (It would cost only $25 per ton to dry the activated sludge). With Milorganite selling at $70 per ton in the same cities, this means dumping hard cash into the sea.



Water heavily loaded with sediment flows into these drying pens to evaporate. The sludge formed here is often used as fertilizer, but should be composted first.

Perhaps it is too much bother for some cities to go into business and make profit. Besides, what do the municipal councillors care about conserving national resources? Perhaps the nation should make them care.

At this point full credit should be given to the people who work in disposal plants. In the past 30 years they have shown a great deal of interest in promoting the utilization of sewage treatment by-products for fertilizer. It is not they who decide whether wasteful methods should be adopted or not. Even when they have nothing better to offer, these men have done a lot in interesting the local farmers in utilization of digested sludge.*

It is very unfortunate that the men who work in fertilizer research seem to be afraid to tackle the sewage waste problem. With very few exceptions their ignorance of the facts concerning sewage and its treatment is appalling. There is much to be accomplished if only they would get over their fear of sewage, go into disposal plants, roll their sleeves up and go to work.

Treatment of Rural Human-Wastes

When septic tanks or plain outhouse ditches are located close enough to sewage disposal plants, the contents therefrom are sometimes hauled and dumped into the incoming sewage. More often, however, they are either dumped in some out-of-the-way gully or a new hole is dug out and the outhouse moved. The utilization of the contents of septic tanks and outhouses is very rare in this country.

In some European countries where treatment of barnyard manure is an art, there is usually a sump by the manure pit, in which the excess liquid from the manure is collected. It is also a rather accepted practice to connect the drainage pipe from the toilet with this sump. The process is sufficiently sanitary because the putrescible matter is anaerobically decomposed in the liquid. No appreciable loss of fertility values occurs because there is usually enough dilution of ammonia to keep it from evaporating and the liquid is eventually used on land. During hot, dry weather the manure liquid is pumped onto the manure pile to keep it moist, and the excess liquid from this irrigation is aerated by the time it finds its way back to the sump. This promotes a rapid breakdown of the putrescible fraction. The excess liquid accumulated through Fall and Winter is hauled out usually onto a meadow in a tank or a barrel on wheels with sprinkling attachment, much like old-fashioned street-sprinkling wagons.

Along the northern shore of the Mediterranean the outhouses are often built over a concrete tank or at least, over a large terra-cotta container, glazed inside, and up to 100 gallons capacity. The wastes are maintained sufficiently liquid by adding water, so not so much ammonia is lost. The contents are emptied often enough by pumping or with a dipper and are used for irrigating vegetables. This is not a very desirable method.

Of interest is the handling of rural wastes in north-eastern Europe and central and nortern Russia. Very extensive areas of peat deposits are common throughout that area. Peat is known for its considerable moisture and ammonia holding capacity. For many years it has been a practice there to use peat for absorbing human wastes.

A new development in that field are automatic devices in toilets which dispense powdered peat after each visit, keeping the wastes covered at all times.

When the cesspool is maintained in liquid state (with no peat used) the contents are pumped out at intervals and are hauled out to an area where a stockpile of peat is kept. Peat is spread over a level area 12" to 18" thick. The tanks with liquid night soil spread the contents over it. When the peat is saturated with night soil it

*A worthwhile reading exemplifying such effort is the article "Sewage Sludge as Fertilizer" by A. H. Niles *Sewage Works Journal* XVI (4): 720-28 July, 1944 and the comments on this article in the same (July, 1944) issue of the *Journal*.

is piled up in long piles 5' to 6' high and allowed to mature before being hauled out into fields.

Of late in Russia some mechanization has been introduced. A peat bog is drained and the upper layer of 10" to 12" is loosened and pulverized by cultivators and disks designed for this purpose. Then liquid night soil is spread over it and mixed in by disking. Then bulldozers or scrapers pile it up in windrows 6 feet high.

The heat developed in the fermentation of night soil with peat does a great deal in eliminating the pathogenes. Peat also reduces considerably the obnoxious smells as soon as mixing is done. Within 24 hours or so with the fermentation process under way, all unpleasant odors disappear.

The ripe peat-night soil composts, it is claimed, bring better response with crops than animal manures. It is also claimed that in Russia over 43,000 agricultural units (Kolhozes) use peat in one form or another and that the total amount used annually is between 12 and 15 million tons (1 met. ton = 2,205 lbs.). From some local additional data it appears that usually about one-half of the peat is used with night soil. Based on this incomplete data, one may tentatively conclude that perhaps as much as 5 million tons or more of peat-night soil compost are used there.

So-called local fertilizers (manure and composts) were always important in countries with low or limited industrial development. The high rate of use of night soil in Russia (as explained by them) is also due to great loss of domestic animals during the war.

A very satisfactory method of utilizing night soil is now used in India on a large scale. The method is the simple but efficient hot process of fermentation, originally developed in Germany. Because of lack of cellulose materials, city sweepings are used. India, where in the past the use of night soil for fertilizer purposes was rather rare, now is approaching 2 million tons of finished compost production per year. The new method was applied for the first time in 1943. Only 6,000 tons were prepared then. Now the method is used in several thousand villages.

One cannot speak of night soil without mentioning the incalculable amounts of it used by the Chinese. However it must be said that the Chinese are still using the unsanitary and rather wasteful methods they have been using for centuries. Recent small scale attempts to mechanize the composting processes in China in all probability will not make much of a dent on the poor and illiterate Chinese peasant. Perhaps if schemes less ambitious mechanically, such as used in India were applied in China, more success could be expected.

There are a number of other methods of using rural wastes now in use throughout the world which space does not allow to evaluate. Some could be adapted to conditions here; some smaller with the advent of mechanizanot. As the rural population becomes tion in agriculture, the relative importance of the utilization of rural human wastes is also reduced. In communities, however, where small self-subsisting farms prevail or in part-time farming on small acreages the use of methods of utilizing the contents of cesspools would probably be not only more useful, but also more sanitary than the prevailing disposal of such wastes.

Of significant importance to agriculture at large is the promotion of an efficient utilization of sewage wastes in cities and towns. With the advent of garbage disposal the wastes in sewage are growing in quantity per capitata. With all sewage flowing to one point, the disposal plant, the conversion of it into fertilizer can be made more economical. City sewage is like a gushing oil well, except that unlike an oil well, it does not stop gushing. This is the great advantage, and it presents a real opportunity for the American inventive genius to crack this all-important problem.

We must stop this run of wealth into the sea. If enough people demand it, it will be done.

What About DDT?

By DR. WILLIAM H. EYSTER

IN January, 1944, dichlor-diphenyl-trichlorethane, now commonly known as DDT, made headlines in American newspapers, as "Army Develops New Insecticide to Destroy Lice," and "Paralyzing Chemical Kills Flies, Lice, and Other Pests." Sensational stories appeared in the Sunday Supplements, many of which were more fanciful than factual. DDT is not new as it was produced in Europe more than seventy years ago, but it was not until 1939 that its insecticidal properties were discovered by Geigy Inc., Swiss chemical manufacturers. Tests confirmed the claim that DDT would control body lice, and the American Army soon recommened its adoption as a replacement for the louse powder then in use. It was used also for killing flies, moths, mosquitos, and other insects which act as carriers of disease-producing organisms.

As early as 1945, DDT was treated on truck crops by the U. S. Department of Agriculture in cooperation with the University of Wisconsin with no apparent injury to any of the plants treated except cucumbers and squashes, as reported in the Market Grower for May, 1945.

Mr. Charles L. Hovey, entomologist with Eastern States Farm Supply Service, made great claims in 1946 for DDT as the all-purpose potato insect killer. According to him the potato plants are not injured, and the U. S. D. A. working in Maine that year obtained an increase of 73 per cent in DDT-treated plots as compared with check plots. Large amounts of DDT were fed to cows, horses, and sheep. The cows and sheep lost appetite, developed marked tremors and became excitable, and their eyes assumed a wild or alarmed stare. All animals are reported as having recovered. No data is given on the residual effects of the DDT. On the basis of such experiments, the DDT was regarded as not sufficiently toxic to warrant its being labeled as poisonous. According to P. N. Annand, chief of the bureau of entomology and plant quarantine, the following warning appeared justified: "As a result of all this experience, we are convinced that the handling of insecticidal formulations containing DDT does not present undue hazzards which would justify the labeling of either the chemical or insecticidal formulations as poisonous. DDT is not a caustic poison, a primary irritant and probably not a sensitizing agent .... therefore, it is our opinion that DDT does not belong in the class of compounds usually labeled 'Poison' with the skull and crossbones. DDT does, however, warrant exercise of caution in its handling and use...."

By 1947 the U. S. D. A. was not so sure that DDT is not poisonous, and was recommending dichloro-diphenyl-dichloro-ethane which is known as Rhotane or DDD. This new insecticide is a close relative of DDT but is claimed to be so much less toxic to human beings and farm animals that it is safe to put on vegetables intended for table use.

On the basis of the above premature and ill-advised recommendations, DDT and other newer and even more toxic insecticides and weed-killers have been used widely by farmers, gardeners, orchardists, and even foresters.

Limitations of DDT

DDT has definite limitations. It does not differentiate between insects which are injurious to plants and those which are beneficial to plants. According to the Florida Grower for September, 1945, DDT cannot be used in citrus groves because it would destroy the predatory insects essential to the natural control of the purple mite, six-spotted mite, and aphids. Experiments have shown that DDT has no value in the control of aphids. This means that its use on vegetable crops would lead to disastrous infestations of aphids.

According to the Rural New-Yorker, many of Connecticut's fruit growers reported in a meeting of the Connecticut Pomological Society that they were sorry they had ever commenced using DDT and other new insecticides in their orchards. These insecticides upset the balance of nature in orchards, killing many insects but having no effect on many others. The red-banded leaf roller actually thrives on DDT although many of its natural enemies are killed by this poison. Before DDT it was a minor annoyance, but since DDT has been used the red-banded leaf roller has damaged a good percentage of Connecticut's apple crop. Also the two-spotted mite and the the European red mite are on the increase since DDT has been used in the apple orchards.

Birds, bees, fish, crabs, and other useful and necessary forms of life are being killed wholesale by the improper though well-intentioned use of DDT. According to Dr. C. H. Curran, curator of insects at the American Museum of Natural History, "DDT, if improperly used, might actually prove more devastating to man's economy than the atomic bomb." The devastation can come from killing off beneficial and higher animals. For example, there are 25,000 kinds of flies in this country, of which 24,500 are beneficial or harmless. These flies pollinate flowers and kill other insects which are harmful or annoying to plants, animals, and man. John H. Baker, president of the Audubon Society reported a 50 per cent reduction in the bird population in six days in a test area in Texas which had been dusted with DDT at the rate of 4.36 pounds per acre, and a 65 per cent reduction in six days among common kinds of birds in a Maryland woodland tract after aerial dusting of a similar amount of DDT. Some birds may not be killed directly but by eating poisoned insects. Forty-eight hours after a five-pound-per-acre dose of DDT was dusted over a woodland, Richard H. Pough, research associate of the Audubon Society reported the *woods were silenced* and all birds except hawks, hermit thrushes, and some towhees were believed killed.

According to Edwin W. Teale in the Nature Magazine for March, 1945, it is estimated that one thousand species of wild flowers would be wiped out if honey bees were not on earth to perform their task of pollination. If these essential insects are wiped out by the continued misuse of DDT and other even more toxic substances, it will become necessary for man to pollinate his own apple, pear, plum, cherry, and other fruit trees not to mention the thousands of other plants which depend upon bees for proper pollination. This task man would find a considerable and an exacting one. All of these pollinations must be made within a relatively few days in spring.

Balance of Nature

Experiments by such competent agencies as the Bureau of Entomology, the Forest Service, the U. S. Public Health Searvice, the National Audubon Society, the American Museum of Natural History, and others have clearly revealed that DDT is not the selective pest exterminator that the public has been led to believe. It poisons not only the one per cent of so-called "harmful insects" but also the *ninety-nine per cent of beneficial insects.* It has been found to be poisonous, under certain conditions, to plants, humans, birds and other warm-blooded animals, and especially to fish,

crabs, and other cold-blooded animals. *It is poisonous to soil and water.* The general public should realize that the majority of insects are not only beneficial but are also absolutely INDISPENSABLE to human economy. Hundreds of thousands of different species of plants are dependent upon insects, especially bees and many species of flies, for pollination; more than 50 per cent of insects are parasitic on other insects. DDT has been shown in many cases to be *more lethal to beneficial insects,* both pollinating and predatory, than to harmful insects.

In the Hood River region of the Northwest, for instance, apple orchards were sprayed with DDT to control moth but the syrphus flies, the lace wing flies, and the hymenopterous parasites, which are the natural enemies of plant lice, were killed; and as a result the woolly aphis, which is not affected by DDT, multiplied to an alarming rate. In other orchards the DDT seems to kill nearly all insects except the red spider which then really take over the orchard. They suck the sap out of the leaves and tender twigs, and thrive in hot, dry weather.

At the University of California, when walnut trees were sprayed to kill the destructive codling moth, the beneficent ladybird beetles were also killed with the result that a horde of walnut aphids, normally eaten by the ladybird beetles, completely stripped the now defenseless walnut trees of all their leaves. Also when cotton was sprayed to kill the pink boll weevil, more harm than good was done as all the pollinating insects were killed. The promiscuous killing of insects is a crime against nature and man which cannot be justified but which should be prevented by law. The elimination of all insects from this earth would be a global calamity.

It is not yet known to what extent DDT actually injures plants themselves, although extensive damages have been reported for tomatoes, cotton, and other plants. Practically nothing is known of the effect DDT has upon the many beneficial organisms in the soil, as bacteria, actinomycetes, yeasts, and other fungi.

DDT Is A Soil Poisoner

DDT and some of the other new wonder bug-killers were reported by the American Association of Economic Entomlogists as being *soil poisoners.* To complicate matters these insecticides seem to be harmless in some kinds of soils but interferes with the growth of plants in other kinds of soils, according to Dr. Gullinan. The Bureau of Plant Industry has issued a warning that serious trouble may be encountered in as short a time as three to five years on some soils and some crops. How long the toxic effects of excessive quantities or repeated doses of smaller amounts of DDT will remain in any particular field is not known. It seems to be more toxic in light than in heavy soils, more toxic in soils low in organic matter than in soils well supplied with organic matter, and more toxic in alkaline or neutral soils than in strongly acid soils.

DDT Pollutes Water Supplies

DDT and other poisonous materials sprayed or dusted on the plants and soil of an area are washed from the higher ground to streams and ponds where they kill fishes, crabs, and many other forms of aquatic life. These insecticides *constitute a threat to public water supplies.* According to Dr. J. Moore Campbell, Deputy Secretary of Health and acting chairman of the Sanitary Water Board, "Pollution of streams from every source is in violation of the anti-pollution laws...."

Effects of DDT on Health

The Food and Drug Administration insists that all DDT residues be eliminated from canning fruit and vegetables. According to the research laboratories of Hess & Clark, Inc., of Ashland, Ohio, spraying of pastures or woodlands where dairy cattle graze may poison users of their milk. Female rats drinking this milk had their milk

poisoned so that their sucklings died. Dr. Paul B. Dunbar, commissioner of the food and drug administration, recently said that experiments showed that as little as one part in a million of DDT, would develop liver damage in a rat's lifetime. It is still too early to evaluate fully the injurious effects that DDT has upon the health of animals and man.

The first to claim that DDT has actually caused disease in human beings was Dr. Morton S. Biskind of New York, who wrote in a recent issue of the Journal of Digestive Diseases: "Evidence is presented that the new syndrome (set of symtons) widely prevalent in the United States for more than two years and attributed to infection with a hypothetical 'virus X' is in reality due to DDT poisoning." In more than 200 "virus X" cases, Dr. Biskind has found evidence of exposure to DDT. The "X disease" in cattle, reported to have caused serious losses among cattle in 26 states, bears a close resemblance to the effects of DDT poisoning. According to Dr. L. S. Henderson of the Division of Insects Affecting Man and Animals of the U. S. D. A., "Although the chemical (DDT) was absorbed in the hide and secreted in the milk in very small amounts, the department concluded that it was not harmful to the animals." This leads one to wonder to what extent the effects of DDT are cumulative in the body of the animal and man and how it will effect health in subsequent years when it is too late to do anything about it.

The claims made by members of the U. S. D. A. and others that DDT is not injurious to health must be regarded as immature and not in accordance with the facts. According to Dr. W. B. White of the Food and Drug Administration, as reported in the County Review, Riverside, N. Y. for August 12, 1948, "under strict provisions of the law, DDT cannot be used on the edible portions of fruits and vegetables.

According to a recent issue of the Chicago Journal of Commerce blanket authority to prevent the sale of pesticidea and synthetic food emulsifiers until they are cleared as safe for humans and animals will be asked in twin bills to be introduced in the House of Representatives. Rep. Frank B. Keefe (R. Wis.) said he would ask Congress to bolster Food and Drug Administration authority to prevent the unrestricted use of untested chemicals where they may contaminate food used by humans and livestock. He declared his purpose is "not to stop scientific progress" but to protect the general public from the use of new chemicals until it is proved beyond doubt that no harmful effects will result from their use. He cited severe damage to most of New Jersey's potato crop last year through the use of a new chemical to kill wireworms. "It killed the worms all right, but spoiled the potatoes," he commented.

In the Cleveland, Ohio *Plain Dealer* for May 5, 1949, Margaret Suhr Reed had the following to say about poison sprays:

Poison sprays are under grave suspicion in Ingleside Road and vicinity in Shaker Heights. Dead and dying birds, particularly robins, are being found, and their condition indicates poison of some kind.

No marks of injury are noted, and presumably cats are not the culprits.

Mrs. E. C. Arndts, 3326 Ingleside Road, was the first to report the situation.

"This morning I saw a robin acting strangely in the back of the yard," she said yesterday. "When I investigated I found it was gasping for breath, fluttering its wings and unable to get up off the ground.

"Later, I learned that a number of either dead birds or others acting in the same way and later dying had been found in the neighborhood.

"There has been a lot of spraying of elms around here, and I can't help wondering if that is what is causing it."

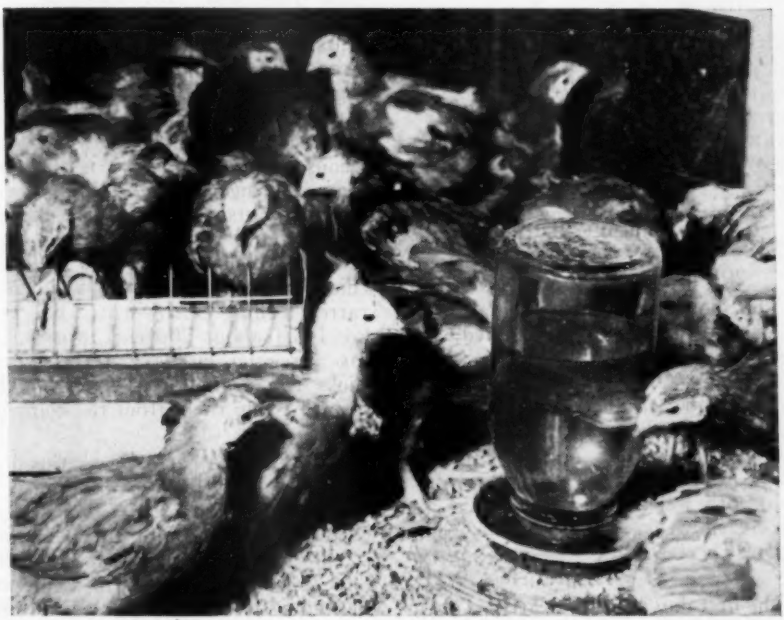
A Perfect Score Growing Chicks

By RAYMOND GREENBAUM

HEALTHY chicks mean future healthy hens. Here at the Rodale Experimental Farm we had a perfect score, 100 out of 100 chicks alive, healthy and growing after 12 weeks of age. Just how we did this, using our own feed mixture of organically grown grains, I'll explain from the day we received them.

Chicks are almost always healthy when hatched. It is best to buy them from a reliable source that you know has a good record. Our chicks—New Hampshire Reds—were purchased from a known, proved source.

Before the arrival of these chicks it was necessary to prepare the brooder house and mix up a batch of feed. The brooder house was scrubbed out with hot water. I lined the interior, three side walls, with discarded rockwool insulation cardboard cartons. These cardboard boxes were folded making a double thickness and required two nails each to hold in place. I used 15 cardboard boxes and did the



Pullets from the "100 per cent" group on the Organic Farming experimental farm.

job in about an hour. These strips of cardboard made an air space of four inches that acted as a vapor barrier and gave good protection against dampness. The four corners of the brooder house were rounded by putting strips of cardboard 2 ft. high in the corners. Three inches of coarse ground corncobs were spread over the floor for litter. This litter lasted the entire brooding period of eight weeks, when the chicks were moved to larger quarters. A coal-burning stove was started three days before arrival of chicks. The temperature was adjusted to 100°. The temperature of the house was never over 100° during the first week. The second and third weeks the temperature was kept between 80° and 90° and near 80° after the third week. All water fountains and feed hoppers were cleaned with hot water.

The following is the mixture of grains ground fine with our own hammer mill:

80 lb.	shelled corn
50 lb.	wheat
25 lb.	oats
20 lb.	alfalfa meal
30 lb.	whole soy beans
15 lb.	fish meal
2 lb.	cod liver oil
3 lb.	ground limestone
1 lb.	salt
5 lb.	dried milk powder
241 lbs.	
50 lb.	fine cracked corn
291 lb.	total

The above seed mixture lasted seven weeks and the amounts consumed each week were as follows:

1st week	11 lbs.
2nd week	20 lbs.
3rd week	31 lbs.
4th week	40 lbs.
5th week	48 lbs.
6th week	70 lbs.
7th week	70 lbs.
	290 lbs.

The first day the chicks arrived they were fed coarse sand and medium sized grit. This was spread on six one-foot square pieces of cardboard spaced around outside the hover. Three one-quarter glass jar water fountains were placed on wooden blocks and spaced around hover. The second day I started feeding mash and cracked corn. The water fountains were placed between each feeder. A shallow box was always kept full of sand and grit.

The routine followed each day required one man-hour. At 7 A. M. the coal stove was raked, cleared of ashes and refilled with coal (chestnut size). All feed hoppers were filled. Feed in troughs was stirred up before refilling. Water fountains were cleaned with a brush and refilled with fresh water. At 4:30 P. M. stove was filled with coal, feed hoppers filled, and water fountains cleaned with brush, rinsed, and refilled with fresh water.

Each week the litter of ground corn cobs was stirred up and raked level again. This was done on a warm sunny day and kept the litter dry and the droppings mixed into the ground-up corn cobs. On warm sunny days ventilators and windows were kept open. During the day three 50-watt lights, suspended from ceiling, were turned on. No lights were on at night. Beginning with the third week the water fountains were changed to two-quart size jars. I like the glass jars because you can see when they are clean. During the week I built a wire enclosure outside using 1" mesh wire, 18" wide, and 50' long. This enclosure gave the chicks an area 350 sq. ft. in which to exercise. This is when I started feeding earthworms. The first day I fed about 200 earthworms. It was a regular circus watching these chicks run around and fight for the worms. I dug them from the compost pits we have.

I counted the earthworms the first week, but after that I just filled a bucket with worms and compost and scattered them around the enclosure on the ground. I would judge there were 750 to 1000 worms in a bucket. On cold or wet days I put the worms in the sand box inside the brooder house. I fed worms to these chicks

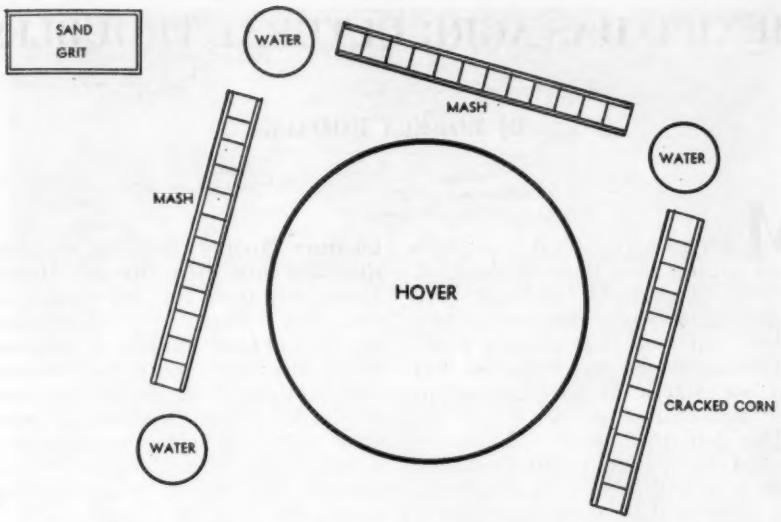


Diagram of brooder house layout used at Organic Farming experimental farm.

twice each week. When dandelion plants became plentiful, I'd cut a mess every day and give it to them. They sure ate it up.

Raising chicks and getting them off to a good start depends a great deal on the person taking care of them. The human angle enters into the picture as a major factor. A poor job of brooding will offset the best methods of breeding, housing and feeding. Every time you're in the brooder house it pays to observe the chicks. Are they eating properly? Does the litter need cleaning? When a storm comes up you have to remember the chicks and whether the ventilator windows are open. Predicting the weather or sensing a coming shower will enable you to take the proper precautions and care for the chicks before damage is done. A keen sense of observation, plus good care and feeding, all tend toward raising healthy chicks to better pullets and egg production.

Out of 100 chicks, 100 came through.

THERE will soon be published THE ORGANIC FOOD DIRECTORY, to be printed quarterly, in which will be listed those who have organically produced food for sale. It is expected that within a few years the distribution on each printing will amount to a million copies. At the start the cost of listing will be nominal and will increase as the circulation increases. It will be printed in different editions, one for each broad region of the United States.

For a listing write us, detailing fully what you have to sell, and what is the method you have followed in growing it. Write to:

THE ORGANIC FARMER
EMMAUS, PENNA.

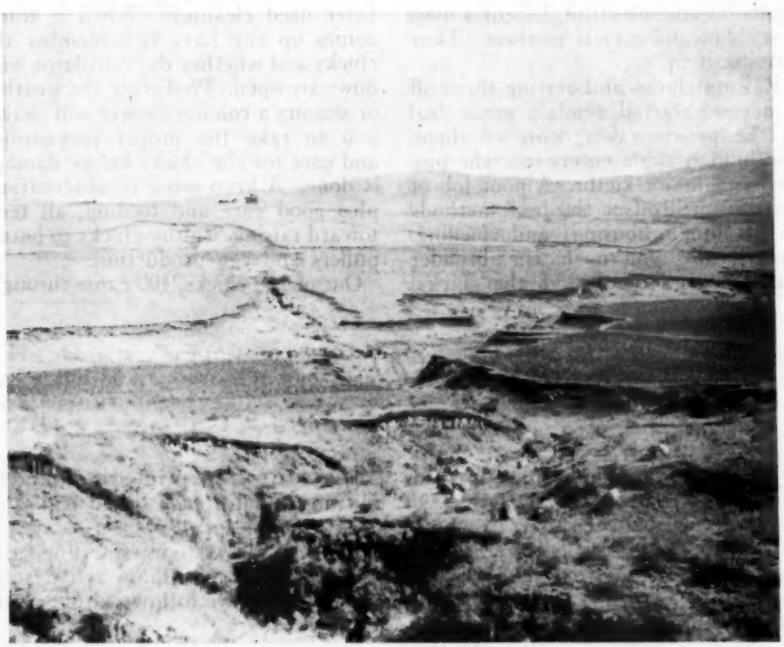
MEXICO HAS AGRICULTURAL TROUBLES

By ROBERT RODALE

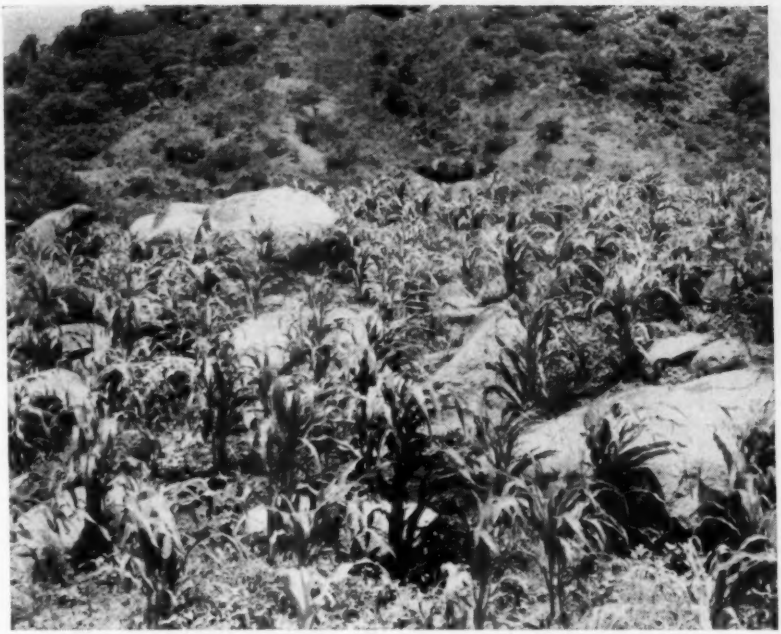
MANY agricultural problems much greater than those of the U. S. are now facing the Republic of Mexico, our neighbor to the south. As a recent visitor to that country I observed conditions that made me feel that we Americans have almost an ideal agricultural set-up.

The fact that three quarters of Mexico's farmers are isolated from national and sometimes even local markets prevents them from securing the capital necessary to buy machinery or fertilizer. In the course of my three thousand mile drive through Mexico I saw only three tractors working in the fields. The dealers' showrooms were full of farm equipment, however. Practically all of their farming is done with equipment similar to that used by the Egyptians thousands of years before Christ. In some mountain areas farmers merely make holes in the ground with a stick before planting their seeds.

Two conditions over which the



Erosion of corn and grazing land in the state of Michoacan. Every year these gullies widen several feet.

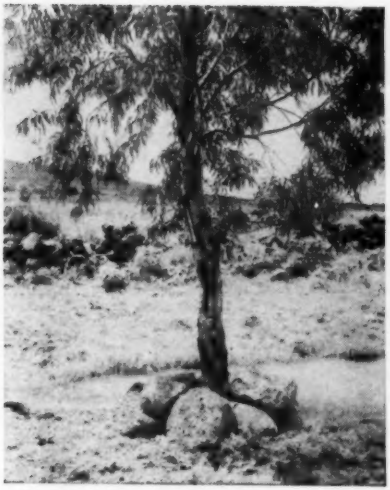


Mexican farmers grow corn in cracks between the rocks.
Even oxen are useless in this field.

Mexican farmer has little control make life extremely difficult for him. First, his soil has a low organic matter content. Some areas have so much rainfall that the organic matter is rapidly leached out. Other localities are so dry that there is little chance for organic matter to form. Since practically all animals are on free range, the Mexican farmer can't collect much manure to spread on his corn fields. Second, because of this low organic matter content, the soil washes away rapidly. In some states the streams never run clear. The rains can't soak in rapidly and the runoff turns the streams into torrents. It is not uncommon to see a wall of water carrying boulders, trees and tons of top soil rush down a stream bed after a rain.

The Mexican government feels that the only solution to their food crop problems lies in the utilization of city wastes and green manure crops. I think they have the right idea. There are fair sized cities scattered all over the Republic, especially in farming areas. Mexico City already makes use of its sewage, but in the raw state. A canal carrying what the Mexicans call the "black waters" empties fifty miles north of Mexico City. There it is spread on the fields. The crops grown in that region are large, but the raw sewage spreads disease and would be more effective if composted.

Green manure crops and cover crops would certainly help stop Mexico's erosion. On the ten thousand foot high plateau west of Toluca the gullies have encroached on the fields to such an extent that they occupy almost half of the farming area. Every year the farmer sees a few rows of his cornfield consumed by the gully. It is not uncommon to see fifty or a hundred corn stalks growing in a patch of topsoil that the gully somehow missed. These farmers are trying their



If a farmer in Mexico wants to make sure a tree will thrive, he mulches it with rocks.

These stones were piled around this tree to keep grazing cattle away. There are few fences in Mexico so cattle frequently wander on the road and into gardens.

best to keep their soil, however. Every acre they can spare is planted in grass.

On the wooded mountain slopes, however, the picture is different. The farmer clears a patch of land with his machette, makes holes between the rocks with a stick, and plants his crops. The fields are at such an angle that oxen are useless. Banana palms and corn stalks seem to be growing out of the side of a wall. When the rains come there is no holding back the land. Within three years the top soil is gone. The Indian farmer then moves off to another part of the mountain and clears a new spot. Twenty years later, when the processes of nature have replaced a small part of the original fertility of the abandoned field, the farmer's son returns to begin the cycle anew.

The Mexican farmer is seriously trying to make improvements in his farming system. He has learned that rocks make excellent mulches around trees. Since the coming of highways and cheap bus transportation he regularly travels to markets far from his home. He is accepting the ideas and the help of the government.

The favorable climate of some regions of Mexico makes it possible for the Mexican farmer to compete in the American market. In late July the farmers in the tropical country along the Gulf begin to plow for their winter tomato crop. This produce reaches American cities when prices are at their peak. A summer crop could also be grown, but the farmer wisely lets his land rest instead of taking low prices.

The recent devaluation of the peso, however, is both a blessing and a curse to the Mexican. On one hand, his products find a stronger market in the U. S. because they are cheaper for Americans to buy. On the other, Mexico is losing much badly needed food. Corn, Mexico's most important food, is flowing to U. S. buyers, making it more difficult for the Mexican to buy.

Fortunately, Mexico's epidemic of hoof and mouth disease is almost under control. A generous loan of money, equipment, and men from the U. S. has practically stopped the disease entirely. These loans have paid dividends by keeping the disease out of this country.

KALE AS A COVER CROP

By C. M. CLEAVER

Reprinted From
The Gallia Times
July 19, 1947

THERE has just been completed a harvest of 20,000 pounds of Dwarf Siberian kale seed on Gallia County Blake Farm (State Route 7), below Swan Creek, probably the largest production for any single unit in the United States.

The background for this venture was the result of a search for plants with certain characteristics. Colonel C. M. Blake, geological engineer, with a broad experience in mining and petroleum exploration, and who has been concerned with the problem presented by the erosion of cultivated lands, was interested in a plant that would combat erosion in intensively cultivated fields, where row crops were harvested to late to get a proper follow up with grass or small grain seedings before the approach of winter.

Col. Blake found that this plant was very hardy and if seeded in row crops at the last cultivation would compete with hybrid corn. He also found that it would gain sufficient stature to withstand the rigors of the following winter.

The first trial was in 1935 with a seeding of one pound, which was harvested by beating out the seed on a paulin. From this was recovered sufficient seed to plant a small field, which in turn was harvested by more modern methods.

From then on a combine harvester was employed and all cultivated fields were seeded down at the last cultivation with this seed. From these seedings in the corn there would result the following spring a lush vegetable growth to plow down for the succeeding grain planting. It was considered that if a different planting was grown in the corn and during the winter for spring plow down that this grain succession could hardly be called monoculture.

In selecting plants to combat erosion there was taken into consideration the subtle, deceptive and insidious types of soil and fertility loss especially likely to occur in low-lying first bottoms in the Ohio River flood plain; such as deep submergence accompanied by high winds. Under such conditions and at flood tide much material is taken up and some of it is redeposited during periods of subsidence. The casual observer, in taking deposit measurements after flood recession often determines this to be a gift, when it can very easily be a redeposited share of a loss. The careful observer will check plant root crowns to determine gain or loss.

The characteristics of this plant, according to the grower, consist of a deep searching main root system, similar in shape to sweet clover, though in most cases slightly larger. Roots have been excavated to a depth of five feet, where they were broken off in handling. No attempt has been made to wash a section of the soil column to obtain a factual determination of these root depths. It does not become dormant in winter, at least to casual observation, but the foliage remains green and apparently vigorous in this climate.

It is thought to be a good subsoiler on account of the depth and size of roots. When cut off by the tillage im-

plement the cellular structure of large root interiors decays more rapidly than the woody exterior thus forming a vertical drainage tube deep into the soil to facilitate the escape of gravitational water.

Foliage decays quickly when disced into the soil so that there is no resistance to percolation or the attractive forces of capillarity such as sometimes occurs with a rye plowdown.

When seeded in open fields and in row crops during July or August it has gained sufficient stature and vigor to withstand the most intense freezes and has withstood as much as fifteen days submergence in Spring floods.

As regards development: the plant in this locality attains a height of three to four feet, depending on the thickness of the seedlings, fertility level, and moisture availability. It blooms in April, bears seed in May and matures for harvest about July 1.

In the plan of operation and cover seedlings on the farm where this is grown there has been more than one desirable objective. The first and most important consideration was to set up defensive measures against the.... possibility of flood erosion. There were to be no bare fields in autumn or winter. A second but almost equally vital aim was to improve soil structure and raise the fertility level. Ranking with this was the use of deep searching roots to seek out hidden soil minerals and the use of the root tunnels to accelerate the percolation rate of gravity water without impairing the attractive forces of capillarity.

Kale and other plants given consideration were thought capable of the accomplishment of the first objective and to satisfy secondary designs in so far as this was possible by the use of a non-legume. With this premise in view it was thought best to combine with a legume in open field seedings for a plowdown. This was first tried with kale and sweet clover in equal parts, wherein the sweet clover would perform the functions of the legume and the kale would grow luxuriously in cool weather, while the sweet clover was in the dormant stage. It worked out with a fair degree of success, but when it was desired to harvest such a field rather than plow down, the clover and kale seeds being so near alike in size and weight, it was found impossible to separate them. Moreover, the recleaners in use by the national seed distributor, who processed the crop, failed to do this.

The next legume tried in the mixture was winter vetch, a plant that grows green and lush in the winter month and furnishes a wealth of close to earth foliage. This planting was made in August 1946 on eight acres of silt loam (Huntington type). It brought on a remarkable jungle growth, where two strong winter plants have battled for the supremacy. The result has been watched with interest until the present. In the early months of spring the odds were even. The vetch then put out long runners, which used the kale stocks for arbors and espaliers. The score remained even until the weight of the vetch vines added to a heavy yield of kale seed pods bore the kale plants to earth. At this point in the uneven war, the kale staged a comeback in that the kale stocks (prone and tangled with the vetch vines) sent up subsidiary branches, which at present are feeding from the parent trunks and bearing a second yield of seed pods, weeks out of season. This freakish action has frustrated any effort to recover the seed of either plant.

Some idea can be had of the size of this operation when it is considered that the fractional part of an ounce (dealer packet) when planted in the home garden will furnish a family with greens all winter and spring. The seeds are just slightly heavier than sweet clover and normally average about 175,000 to the pound.

Farm Compost in Production

By J. VAN CLUTE

TWO years ago H. C. Moore of Redmond, Washington, had never heard of compost. But he did know that his 33-acre farm had a humus deficiency, and that he and his soil needed a physical check-up. Seeking a remedy for himself first he went to a Seattle doctor, little realizing that that trip was to be a red letter day in his life. Today Moore has over one hundred tons of compost on his land, an organic garden and orchard, and a farm growing richer from year to year, while he, himself, has little cause to think of a doctor except in terms of appreciation for some timely advice.

The turning point came in the office of Dr. John E. Lydon. While waiting in the reception room, Moore glanced at the library table. On it was a copy of Organic Gardening Magazine. Organic gardening? What was that? Well, thought Moore, anything about gardening interests me, and right now I have a few minutes to read. He read slowly at first, and then avidly. He read about soil humus through the medium of compost made from waste materials and animal refuse. Humus—organic matter—mycorrhizal relationship. He stopped at humus and organic matter. On his farm he had a lot of bracken and other weeds; also some livestock. He read about "pay dirt" made from wastes. Just like pulling oneself up by his bootstraps. It sounded so simple. It was—and then someone tapped him on the shoulder.

"Mr. Moore, you're next," said Dr. Lydon.

Moore blinked. Should he stop reading now, or lose his turn? "Doctor, this magazine of yours—all that organic stuff I've just been reading, is it true that there's something to it?"

Dr. Lydon smiled benevolently—enthusiastically. "Is there? I'll say there is. Every word is true. Organic gardening is Nature's way of growing foodstuff for health. The method is as old as the hills, but unfortunately I'm sorry to say that apparently too few people know too little about it."

That, coming from a physician holding so many licenses for practicing medical and health service in the State of Washington! For Dr. Lydon is licensed to practice Medicine, Surgery, Food Science, Chiropractic, Hydrotherapy, Mechano-therapy, Physiocultopathy, Sanipractic and Suggestive Therapeutics. Moreover, he's the author of sixteen textbooks on Sanipractics; also the author of the state law permitting its practice. When the writer told him that a new publication, Organic Farming Magazine was to appear, he said: "Good! Organic Farming is really basic. It will give more people more healthy food."

But back to his patient. Moore had but one question. Would the Doctor be kind enough to loan him the magazine a while? Dr. Lydon would, and did. At home that evening Moore read every word in the magazine, and before he came to the last one, he was sure of one thing: He would subscribe for Organic Gardening Magazine.

"And that's the story," he says. "Through Dr. Lydon's encouragement and a magazine subscription I became a compost convert. At first I thought that compost sounded too good to be true. But my two years' experience proves that it's as good, if not better,

The machine is used to produce compost on a large scale.

than all claims made for it. I can hardly wait 'till the next magazine issue arrives. Each one 'lifts' me."

That's his story, but it's not the whole story by a long shot. He has gone into mass production of compost on a farm scale, and that's a story of initiative and mechanical ingenuity, plus willingness to work for what he gets, for he has a philosophy that there is no substitute for sweat.

Eight hours a day, five days a week Moore works in a furniture factory. Near the factory is a big dairy concern which was glad to give him stable manure and old straw just for hauling it away. Moore started commuting in a truck, bringing home a load of barnyard refuse a few times each week.

But after a day's work in a factory, the forking of stable refuse into composting layers is a big chore, too big for an employee who hopes to farm organically. And there was extra work in cutting bracken growing rampant on the place, too. So it was that Moore's resourcefulness went into high gear, bringing into play his mechanical ability. After forking a load of refuse one evening he climbed into the truck cab and began cruising around the country side—Objective: an old discarded threshing machine. He had never seen a compost shredder, but he had a hunch that with a little trial and error he could turn an old thresher into one. Finally he found it—an old, small model Case thresher in the discard for years. He could have it for a song, and he was ready to sing.

With the machine parked in Moore's barnlot, out came the tool kit. Evenings his neighbors saw him tinkering on an old decrepit machine and wondered why he was doing it; today, when he has a machine shredding forty tons of compost material daily, they ask him how he did it.

"Easy," he says, and makes it sound that way. "Just a little mechanical know-how," he adds. Like a surgeon, Moore made an incision in the side of the machine and went after the "innards." In one major operation out came the shakers, screens and "about a truck load of other gadgets." In went

a web conveyor, slatted at intervals and extending from beneath the cylinder to a point ten feet beyond the rear of the machine. Though different in construction it works on the same principle as the old style stacker.

Inasmuch as manure, straw and weeds will choke down most any old thresher, the feeder end of the machine was a bigger problem for Moore. Like a dentist he yanked out the lowers—concaves—and adjusted the cylinder denture by turning every other tooth half around to provide a more hooked, or feeder bevel. And then with the drive belt adjusted to a trac-

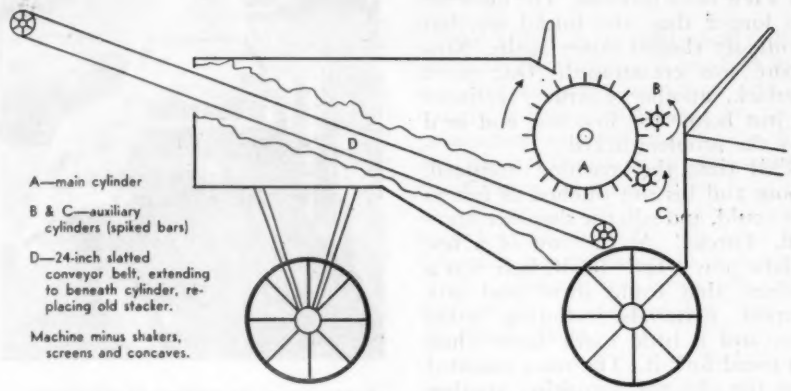


Diagram of Mr. Moore's thresher converted into a compost grinder.

Mr. Moore's compost grinder being used to turn a compost heap. An old Case threshing machine was used as a foundation for this efficient compost grinder.

tor, Moore started up and threw in a few forkfuls. The result was just what tickles every straw stacker on a hot August day; with an enervating "kerchug" the cylinder choked, throwing off the belt.

On the shady side of the machine Moore went into consulation with himself and decided to install an auxiliary cylinder in front of the master cylinder, and revolving at high speed toward it. With that done he tried out a few more forkfuls. The machine ran longer than the initial try, but eventually choked down again. Now Moore was encouraged. One more gimmick, another auxiliary cylinder set just below the first one and he'd have the problem licked.

This time the machine hummed. Moore and his son pitched as fast as they could, and still the shredder hummed. Eureka! At the cost of a few dollars, plus a little labor, here was a machine that could shred and mix compost materials—including wood ashes and a little earth—faster than two could fork it. The mass cascaded from the elevator, requiring another hand on the job to keep the pile from pyramiding. Just one more thing needed—a sprinkler hose to play on the pile to hasten the heat process and bacterial break-down.

Today, piles of compost dot Moore's barnyard, waiting to be spread over his farm by means of another labor-saving device he is patterning after the design of the old log-darg.

In converting the thresher into a compost machine, Moore started from scratch. But now he is modest about it. "T'was easy to make," he says. "Any farmer could make one. And just think of all the old abandoned threshers and old combines around the country that could make compost!"

He uses the machine for turning compost piles at the end of thirty and sixty days. At a recent demonstration the heat from the pile during the first turn was so intense that steam oozed from every pore of the machine.

Now Moore has an idea for eliminating the tractor hitch in moving the machine. He's going to mount the machine—which was a small model thresher—on top of the tractor. "That way, I can take it on the road and do custom work for neighbors," he points out. "One minute after I arrive the machine can be operating."

Rear view of the compost grinder in use.

When he bought the farm a few years ago, he tried out chemicals. Result—a compacted, dead soil. This is his second year with compost, and the results are a testimonial to organiculture. With plenty of compost, he now uses it as a foot-deep mulch. This season his raspberry canes are as tall as he, and he's a six-footer. Last year's potatoes, planted in a furrow layered with compost, a little dirt added, and then more compost, followed by a deep straw mulch were large, smooth and flavorful. This year Moore is experimenting with alderwood sawdust mulch. Part of his garden is planted between raspberry rows and is vigorous. Last year he composted two struggling young apple trees; they grew three feet, blossomed for the first time last spring and early in May had a set of fruit and a foot of new growth.

Customers buying Moore's compost by ton and truck load report excep-

tionally good results, but a few came back with an odd suggestion; they wanted Moore to raise composted fruit and vegetables and offered him a premium price for the produce. He replied, "Fine. You'll be getting healthy produce, and my soil will be getting richer."

As he thinks back now, Moore is glad that he had to go to the doctor's office two years ago. "And I'm glad that he had that issue of Organic Gardening," he says. "To me, it was like a message floating down from Mount Olympus and landing right in my lap."

As soon as an acre of ground is brush cleared, on goes a mulch of compost, or if time is pressing, then a truck load of straw and manure. "That saves moisture and makes the soil easier to work," he points out.

One wonders how Moore finds time to hold down a steady job, farm and read so many timely articles on farming. But with the start of composting he works as though inspired. A son, James, is a high school junior, who helps him Saturdays and evenings. Three other sons of pre-school age also do their bit.

His plans for the immediate future call for a grass farm with a loafing shed for a herd of milk cows. Beyond that, he hopes that some day at least one of his boys will become an expert in organic farming, and right now he is seeing that they are getting the "ground work." He thinks there is no bigger or better field for a young man to enter.

The Moore farm on Union Hill, a few miles from town, is reached by a round-about gravel road. But folks are making a path to his door. For he is pioneering up there, only in a different manner from many who settled this country. Instead of robbing the soil of humus, he is building up his land so that some day his boys will inherit a better farm than he bought. That's All-American farming but, unfortunately, that's not the way all Americans farm.

ARTIFICIAL INSEMINATION FAILURE SELLS MORE BULLS

ARTIFICIAL Insemination which many pedigree cattle breeders thought would have an adverse effect on the sales of bulls is, in fact, having the opposite effect. From all over the country I am receiving letters and phone calls from people who have been using artificial insemination, and though in most cases they have very small herds they are so disillusioned by the failure of artificial insemination to get their animals in calf regularly, that they are seeking bulls of their own. I have never known such a demand for bulls, and it is mainly from people who have reached the end of the artificial insemination tether.

My experience was confirmed at a meeting of the Devon Cattle Breeders' Society recently. Mr. A. S. Newbery, this year's president-elect, said he had sold more bulls than ever before during the past year, "to people who had tried artificial insemination and found it unsatisfactory. If artificial insemination is so unsatisfactory," he said, "why this demand for bulls?"

At the same meeting, Commander A. M. Williams said "I have doubts about the long term results of artificial insemination. I think that in 30 or 40 year's time we shall find we have been interfering too much with nature—*The Farmer* (England)

STRAW GIVES LIFE TO SOIL

By THOMAS E. JOHNSTON

THE dairy farming business is short-changing the soil in terms of organic material returned to it for maintaining or building soil fertility. This is not advanced merely as a personal opinion, but as the considered opinion of observant dairymen.

From the front porch of one farm house, where the owner and I were talking about this matter, we could see two straw stacks, both unrotted and remaining just about as they had blown from threshing machines several seasons previously. As we walked to a hill above the house we could see several more. In that locality many straw stacks stand unused and unrotted in the fields. In spite of this, it is a productive and rather prosperous dairy region. We may question how long it will remain so, or how much more productive it would be if better, organic matter were applied to its fields.

"Yes, the cows make a lot of manure," the farmer told me. "But as we take it from the gutters with very little straw, it is mainly pure excrement and almost all solid matter; it gives very little life to the soil. Good manure must have lots of straw with it. That's what livens up the soil".

When he spoke of life in the soil I knew that he had a sound mental picture of soil fertility. Here was an example of an observant farmer knowing that his soil was alive. Life in the soil and rapid decay are truly the measure of soil fertility, as those of us who followed and worked along the lines taught by Sir Albert Howard can testify.

As these thoughts passed thru my mind, the next and most urgent question that came from me was why, since he knew his, did he not act upon it. I reasoned that he might thresh grain near the barn, and blow the straw into the barnyard. There cattle would tramp upon it and mix manure with it. Pigs would furnish labor to turn it over. With judicious direction on the part of the farmer a very good humus pile could be formed. This would be a compost pile adapted to a real farm condition. Or so, unaware of legal obstacles, I thought it should be.

"But we can't do that," he told me. "That's about the way we used to do the job. Our cattle were stabled differently, in stables or pens instead of in cow stanchions. We had horses to do all the field work. We stacked straw in the barnyard, used all we could for bedding, and by spring we had a barnyard full of good manure. That was before we went in for dairying as our main source of income."

"Now dairy sanitation laws or rules don't allow us to stack straw in the barnyard. We can't let any manure lie in the yard. To all practical purposes we have to stable cows on cement platforms with gutters behind them. We can't use much straw. As I said, our manure isn't much good. We have to remove it from the barn each day, and we generally spread it straight to the field as it comes from the gutter."

He continued by saying that he had come to the conclusion that he should adapt a system of composting straw. He asked me how he might proceed to get his straw stacks composted.

At this point we walked over to see one of the stacks which had stood for about three years. This stack appeared at first glance to be just about as it had blown from the thresher. Since the straw had not been needed for bedding, no man had been detailed to stack or build it in such a way as to to shed water. In spite of this, the straw had shed water and resisted decay remarkably. It had taken water, however, at several places, and here areas of decay had started. Children playing on its top and sliding down its sides had helped beat down its water-shed form and allowed it to take some water. Skunks had burrowed into the stack some eight feet above the ground, and their entrance runway had helped start decay at that point. Altogether probably a dozen loads of material had rotted to the point that they could be spread with a manure spreader. Unrotted dry straw is too bulky to handle in a manure spreader.

To promote decay in the rest of the pile, we concluded that he devise a way to mix nitrogenous material with it. I suggested some materials rich in nitrogen, and since the stack had already set, to punch holes in from the top and sides and add some tankage, bone meal, or cottonseed meal. I cautioned against the use of sulphate of ammonia and other chemical fertilizers which would discourage earthworm and microscopic life of the soil. These chemical fertilizers would thus act directly against the main purpose which was to promote a healthy decay in the pile and eventually, when spread to the field, a healthy earthworm and microscopic life in the soil.

As we were considering how he should handle straw in the future, I observed that he would probably soon be using a combine and could best allow the straw to lie in fields where it fell. He objected to this as he said the straw cover would prove heavy enough to cover and smother young grass and clover seedlings. In the eastern United States a large percentage of grain fields are nurse areas for young grass and clover and will develop into hay or pasture fields the following year.

It is my belief, buttressed by experience and observation, that when the decaying power of soil is increased by composting, soil will develop enough digestive power to take in a cover of straw rapidly enough that it would not smother young grass. This is offered mainly as a matter of conjecture.

In managing straw blown out of a stationary thresher, it could be much better handled if it were blown out on a pile six to eight feet high, about sixteen feet across, and as long as it may go. Manure may be added to this pile in layers as it is built, or worked into it later, as may be more expeditious. A man should be detailed to keep this straw pile in order as it is being blown out, and whether he happens to be a good experienced man at straw stacking or not, he will need to work directly opposite to what a good straw stacker would do. A man building a straw stack to shed water will stay in or near the middle of the stack, keeping the middle full and well tramped down. When the stack is complete, the outer edges will settle much more than the middle, and a good water shed will result.

A man building a compost straw pile should do as nearly opposite as possible. He should tramp the outer edges, and keep hem straight and as nearly perpendicular as he can. He should stay out of the middle and leave it in a hollow condition by forking straw from it. When this pile settles, the hollow middle will be aggravated. The result will be a pile which will take water and rot in a relatively short time. If some nitrogenous material is added to such a pile with some ground limestone and a sprinkle of soil, it will soon decay to form lifegiving humus, the material assigned by nature to the task of giving life to soil, to plants, animals, and people. Chicken manure is ideal as the nitrogen- rich ingredient for such a pile. It often happens that laying houses are cleaned in summer, before

housing the pullets being brought in from the range.

If grain is threshed by a combine, enough straw can be raked up and baled as the farmer may need to bed his livestock, and then the remainder can be raked together on piles for composting.

The technique of making good compost is entirely within range of farmers. As Mr. J. I. Rodale has said in "Pay Dirt," farmers do many jobs which are biologically and chemically more intricate than making compost. Such techniques as seed innoculation, soil analyses, plant and animal selection, preparation of feeds, and many others as intricate, are all chores of modern scientific farming. Fundamental to success in any agricultural business is a healthy and fertile soil. In fact, proper attention to soil, learning the composting technique, will eliminate the need for many others.

HEDGES CONTROL SOIL

British Method
From the Sydney (Australia) Morning Herald—March 1, 1949

SIR,—Last year you published considerable correspondence on soil erosion. It prompted me to obtain from oversea authorities some information about erosion problems in the United Kingdom and Europe.

I was very impressed with one of the replies received last week. The writer says:—

"Very little has been written about European methods of controlling soil erosion. In brief, the Italians and French have terraced for centuries, and this terracing, especially for vineyards, extends through Switzerland to Germany, especially along the Rhine.

"The British, on the other hand, have controlled erosion by the accidental methods of hedges, and by the afforestation of hilltops. With the possible exception of Wiltshire, almost everywhere in England you will find the hills covered with woods, a good many of which, in times past, were established for scenic or game purposes, but they have had the effect certainly of preventing scouring run-offs.

"The hedges and stone walls act, of course, as breakers on hillsides, but again were developed primarily not as erosion controllers, but as the easiest and most permanent form of boundaries for cattle.

"It is for these reasons, among others, that soil erosion has never been a problem in north-west Europe, consequently there is little literature on the subject. . . .

"But I think the facts are obvious: The U.S.A., Australia, and New Zealand have destroyed hillside vegetation —we have kept it. The U.S.A., Australia, and New Zealand use wire fences for boundaries; we and north-west Europe generally use walls or hedges. The woods on the hills and the hedges all help check rain and wind and to provide the humus to build up new soil; the wire fence does none of these things.

"It seems to me you need a bold reafforestation policy, especially on the hills, and the creation of hedges or terraces on all challenged land. The American method of contouring is often a trap, for whilst the original lines may be accurate, nothing stops the farm-hand ploughing from taking a shorter cut each year, and then contouring becomes funneling and erosion is worse than ever.

"It has taken us several centuries to hedge, ditch, and afforest—you can do it in thirty years."

A. R. PENFOLD, Director,
The Museum of Technology
and Applied Science.

The 1949 Organic sunflower crop during August.

Harvesting Sunflowers

By ROBERT RODALE

SUNFLOWERS are rapidly gaining recognition as an effective poultry and cattle feed and even as a health food for humans. Extensive fields of sunflowers can be found in many parts of the country. Perhaps the most common sunflower being grown on a commercial scale is the large-seeded Mammoth Russin variety. It is remarkably free from insect and other infestations.

Because the sunflower turns its head with the sun, it is able to soak up large quantities of the sun's life-giving energy. Plants have grown on the Organic Gardening experimental farm that reached a height of 18 feet. The diameter of the head often approaches 30 inches. The stalks can sometimes be compared in thickness to a man's arm.

The comparatively small seed out of which this giant springs in one season has great nutritive value. Tests have proven it rich in iron, calcium and phosphorous, and it contains traces of the element fluorine. It also contains a liberal quantity of vitamins. All the richness in the kernel of the sunflower seed is protected by its hard shell. The shell must be cracked off with the teeth or fingers before the seed can be eaten by humans. However, the seed can be

ground up whole with corn and other grain for cattle feed and it is often mixed in scratch feed for poultry.

Harvesting the large sunflowers presents a problem. They are too high and too heavy to be handled by a combine and the toughness of the heads makes threshing difficult. The smaller sunflower varieties can be combined, but their yields are not big and their seeds are small.

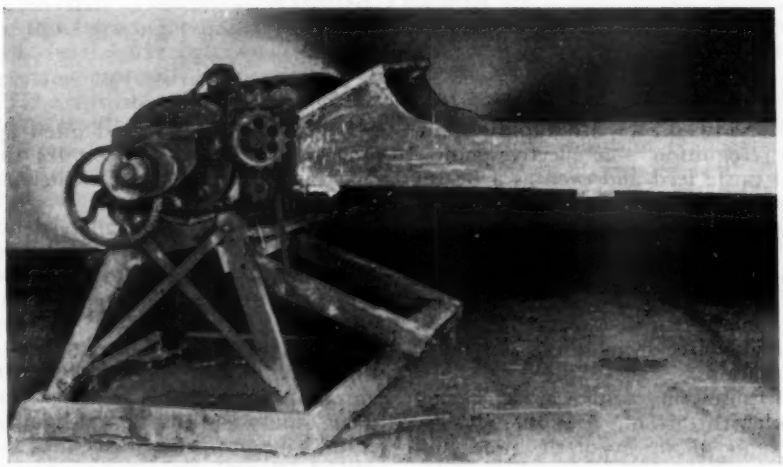
It is best to allow the sunflowers that must be harvested by hand to dry in the fields on the stalk. The birds and animals will pick only at those few heads that fall to the ground. If the heads are taken indoors to dry there may be costly depredations by rats.

The dry heads are harvested by driving around the edge of the field with a wagon or truck and clipping them off with a pruning shears. They are then run through a corn fodder shredder which knocks the heads apart and loosens the seeds. After a quick screening operation to separate pieces of the stalk and the head, the seed is cleaned by running through a fanning mill. An effective hand-powered fanning mill can be purchased cheaply.

A good crop of sunflower seeds may yield 1600 pounds of seed to the acre. About three or four pounds of seed are planted in each acre in 38" rows. After the plants grow to the height of a foot they are thinned out, leaving a three foot interval between each plant.

It is inadvisable to plant a cover crop in the sunflower field as is done with corn. The abundant shade provided by the sunflower leaves kills all grass and weeds. After the crop is harvested the stalks are disked in. The field must be left bare for the winter.

The reader can find out more about the potentialities of the sunflower by reading "Sunflower Seed: The Miracle Food" by J. I. Rodale. The book can be purchased from "The Organic Farmer" for fifty cents.



Sunflower heads can be run through a corn fodder shredder like this one to separate the seeds.

PASTURE YOUR FLOCK

By THOMAS E. JOHNSTON

A YEAR or more ago a song with the refrain "The best things in life are free" caught popular fancy to the extent of becoming a nation-wide hit. No doubt a lot of people who sang and danced to it went right on trying to buy health for themselves or their animals.

Maybe even poultrymen, caught in the meshes of that little tune, whistled it as they spread bought-vitamins before their chickens. Certainly millions of dollars were spent for "vitamin-fortified" feeds for chickens, whose owners didn't know that all a chicken needs for health is as free as all outdoors.

"But how can vitamins be free?" you may ask. "Is socialized preventative medicine being planned to include hens and chickens, too?"

Rightly we have learned to be wary of that word "free", assuming that it really means we are going to pay for something at an unsuspecting moment or in an unexpected way.

When we say that vitamins which bring health to chickens are "free", we merely recognize that they are available from sources other than fortified feed ingredients or bottles and capsules dispensed over drug store counters.

Sunlight is recognized as an abundant source of vitamin D. Granted, it may require mental effort and work to get chickens into the sun; it may even cost money. It will probably cost no more, however, than to keep them out of the sun. We will surely have to revamp the artificial pattern prevalent in today's chicken business to allow birds to make the most of nature's opportunities.

Dr. H. R. Bird, poultry nutritionist with the United States Department of Agriculture, reported in the 1947 USDA yearbook the discovery that cow manure is a "valuable source of vitamins for chickens and turkeys".

His investigations showed that the addition of dried "cow manure to a low-grade diet enhanced the growth of chicks and stimulated comb growth". This growth factor survived in cow manure dried at a temperature of 45 degrees centigrade, but was destroyed in samples dried at 80 degrees centigrade. Note that even the higher of these temperatures is lower than the boiling point of water, 100 degrees centigrade, indicating that the factor may easily be killed by heat.

Although Dr. Bird cautions poultrymen against using fresh cow manure as a procured addition to the diet of confined chickens, he sees merit in the old practise of allowing chickens to run freely in barnyards. A cow tethered on the poultry range should be able to supply this growth factor to many chickens.

Dr. Bird reports more of his findings and observations on poultry nutrition in the USDA yearbook of 1948, the most recent yearbook entitled "Grass".

His subject in this later report is "The vital 10 per cent for poultry". He calls attention to experiments performed at the Ohio, New York, and Kentucky agricultural stations as well as in Canada and Great Britain.

Summarizing results of these experiments, Dr. Bird comments: "In the

Chickens on range need no vitamin fortified feeds to get vitamin D.

nutrition of chickens, turkeys, and ducks, grass may be looked upon as home-made vitamins, particularly vitamin A and riboflavin."

At the Ohio experiment station pullets were pastured in a ladino clover field at the rate of 250 birds per acre. These pullets were fed a "simplified" mash, as distinguished from a "fortified" mash. Their feed mixture included 90 parts of ground corn, six parts of bone meal, and two each of oyster shell, granite grit, and salt. These pullets ate whole corn along with their mash and ladino pasture.

Conspicuous by their absence from this diet are such expensive items as meat scrap, soybean oil meal, fish meal, and wheat germ. In spite of the omission of these protein and vitamin-bearing items, it is reported that these pullets thrived quite as well as those fed more elaborate diets.

As we follow chickens about on the range we see them eat a cricket here, a grasshopper there, dig an earthworm from its underground tunnel, pick at a succulent clover leaf, and shred a blade of grass, all within a few moments.

Nutritionists agree that if satisfying natural hunger from many sources, birds and animals are likely to find all elements necessary for body building. Any required element is of vital importance, whether needed in trace amounts or measurable quantities. Without even the smallest element the chicken might not exist or be unable to live normally.

Sleek bodies of pullets and cockerels, decorated with well-groomed and even feathers, deep yellow legs and beaks, glowing faces, and bright eyes are outward signals by which chickens tell us that all is well with their internal organs and their functioning.

These good-health symptons are possible on well-managed poultry ranges. How can organic farmers make best use of these conditions of natural health found on the range? How can they apply healthy range conditions to laying hens and other mature stock?

First, the organic farmer in building a naturally fertile soil will be able to raise abundant and healthful forage crops upon which to pasture chickens.

It will be an easy step for the organ-

ic farmer to recognize that if range will supply vitamins from natural sources for growing pullets, it will likewise supply much of the requirement of laying and breeding stock. He will make wide use of range-grown vitamins for all his stock, young and mature alike. This will require the use of forage crops remaining succulent during whole growing season.

The organic method can be applied to any branch of farming. The organic farmer studies and solves his problems of plant and animal growth from the viewpoint of the naturalist. He seeks the way in which nature intended them to grow and to maintain abundant health. He realizes that while nature's methods invite endless adaptation, they tolerate no violation.

It is from this viewpoint that I am approaching a series of articles on applying organic methods to raising poultry.

Let no one assume that by calling himself an organic farmer he will cause his problems to be solved or to disappear. By practising the organic method he will see that his problems of soil fertility, animal health and nutrition, and parasie control fall into such a pattern as to make a related unit.

In succeeding articles of this series I will present data and observations on phases of the poultry business to which this article leads. Some of these topics will be: how to establish good poultry pastures, poultry range rotations, useful plants for pastures, daily care of chickens on the range, marketing organically-produced eggs and poultry products, and avoiding parasites and maintaining healthy fowls.

†OVERTILLAGE DESTROYS FERTILITY

By J. I. RODALE

DR. R. L. Cook of Michigan State College, agronomy department, holds that working the land too much is expensive in the first place, and breaks down the soil structure. He is right, especially if the farm is heavily supplied with chemical fertilizers. It then makes it more difficult for the chemicals to work. It reduces the water holding capacity of the soil and roots have a difficult time feeding.

What he means by overtillage is to do the following—plowing, double discing, spiketooth harrowing and cultipacking. He advises only plowing and cultipacking. But we know from experience that where the organic method is followed and the soil becomes enriched with organic matter, the structure not only becomes improved, but it can withstand abuse and overtillage. Ease of handling a soil, once it has organic matter generously added, is one of the prime features of the organic method. The soil does not pack hard. If heavy equipment goes over the land it does not pack down the soil as much as it would a soil which lacks organic matter. An organic soil has a springness which gives under the impact of heavy weight, and then springs back.

Mulches

What Is A Mulch?

A general mulch can consist of any kind of green matter such as grass clippings, leaves, all kinds of weeds, vegetable tops, spoiled hay, sawdust. Diseased plants should not be used as a mulch but should be placed in the center of the compost heap, so that the heat will kill the disease organisms. Such things like sawdust should not be packed too high, as they will harden into a solid mass and prevent aeration. It should be mixed with other material.

Mulching is a natural method of ground-covering. In nature, the trees drop leaves and cover the ground—this is a mulch. When the gardener who follows organic methods also tries to follow natural methods of covering the ground, he uses such materials as compost, leaf, corn cob, straw, etc. mulches. There is also a dust mulch. This means that the ground is so cultivated that the top inch or inches are mere dust which checks evaporation. On the other hand, dust also prevents the absorption of moisture and therefore is not recommended except as a last resort in drought areas. An organic mulch is always preferable because it acts both as a moisture preserver and as a rain absorber; it therefore prevents soil erosion. Mulches serve for the following purposes: soil cover, preservation of soil moisture, prevention of soil erosion, addition of organic matter, slow supply of fertility does away with weeding, and the labor of cultivation.

Since the roots of organically fed trees are near the surface, it is best not to cultivate but to control weeds by using mulches. The mulch should be used thick enough to prevent the growth of weeds under the trees.

Straw Mulch

A hay mulch is much better than straw, because the latter is much lower in nitrogen. In its decay it therefore draws nitrogen from the soil, thus causing a deficiency of that element in the soil.

Combined Rock and Plant Mulch

If rocks are placed above the regular plant mulch, the latter will decay much faster. Do not put diseased plants in the mulch. Place them in the compost heap.

Corn Cob Mulch

Corn cobs cut up into pieces make an excellent mulch. If applied in a thick enough layer they will prevent weeds from growing and eventually will greatly enrich the soil. If the cobs cannot be shredded they must be piled higher.

Miscellaneous Materials

Oyster shells would make a good mulching material as well as peanut shells, spoiled hay, the part of table garbage that consists of green material, chaff from threshing, etc.

Sawdust Mulches

Tests made at the Oregon State college indicate sawdust is the best mulch material for blueberries, and it looks promising for use on strawberries and other small fruit crops.

Wood waste experiments have been underway at the college since 1943, using such products from the lumber

industry as pine shavings, cedar-tow, redwood bark, spent tanbark and fir sawdust.

Partly decayed sawdust is excellent material for mulching. With it you can effectively control weeds, conserve soil moisture, regulate soil temperature and eventually increase the humus content of the soil. Even fresh sawdust may be used for mulching, providing it is not mixed into the soil. Any excess acidity created by sawdust can be neutralized by the addition of ground limestone.

Rotted Wood and Needles Of Pine For Mulching

Q. Are rotted pine wood and decomposed pine needles good for mulching plants?

A. Rotted pine wood and pine needles are organic materials with an acid reaction. These materials are excellent for mulching such acid loving plants as azaleas, camellias, and rhododendrons, and heath or ericaceous plants in general. Before being used for plants that require a neutral or slightly alkaline soil, these materials should be composted with lime to neutralize the acids.

Mulch For Evergreens

Q. How long should the winter mulch be permitted to remain on the soil around evergreen trees?

A. It is good practice to allow the mulch to remain around evergreen trees throughout the entire year. The mulch will be gradually converted into acid compost which is the optimum fertilizer for evergreens.

Mulching Time

Q. Please tell us if all vegetables in gardens should be mulched before they come up, the same as potatoes.

A. It is better for small-seeded plants to be allowed to develop into the late seedling or early plant stage before mulching them. Mulching them too soon may result in plants with spindling stems.

Slugs In Mulched Plants

Q. I am in agreement with those who claim a mulch cover is excellent for maintaining the condition and moisture in the soil. But how do you control slugs in mulched strawberries and tomatoes?

A. Slugs can be discouraged by sprinkling over the mulch dry wood ashes or slaked lime.

Slugs hide under mulches, but by staking our tomato plants and watching other crops that are attacked by snails, we solved that problem very easily.

We can wholeheartedly recommend mulching wherever salt-hay or straw is available. For berries, leaves are also recommended.

For Raspberries

Such plant materials as sawdust, pine needles, and leaves will serve as a wonderful mulch for raspberries.

Orchard Mulching

It is best to first disc the weeds in that are growing under the tree before applying the mulch.

For Vegetables

Vegetables should not be mulched until they have made some growth. The mulch should be thick enough to prevent weed-growth, six inches to one foot thick.

Lime

It might be advisable to give the ground a thin sprinkling with ground-limestone before applying the mulch.

Q. Is mulch all that is needed?

A. No. Compost should also be used. It is applied in the upper three or four inches of soil, mixed in thoroughly. A mulch is never mixed into the soil, until in a few years when it becomes well decayed.

Memos To Farmers

Don't Burn Your Fields!

"Crop experiments in Oklahoma show that burning off a pasture reduces its yield about 50 per cent by killing soil organisms," states the July issue of "Popular Mechanics." Another warning comes from Prof. Roland W. Portmann of the University of Missouri who declares that it is futile to burn grass during the spring to destroy ticks or produce heavier stands.

There are several convincing arguments against burning over fields.

1. Earthworms, bacteria, fungi, protozoa, algae and other beneficial soil organisms, as well as wildlife, are killed.
2. Valuable organic matter, especially humus in the upper few inches of the soil, is consumed.
3. Soil moisture is dried up and the water table is lowered.
4. Earth particles are broken down and porosity suffers.
5. Adjacent fields, forests, and even buildings are endangered.

Field burning has been attributed one of the causes of the rapid subsidence of peat soils in the rich Sacremento-San Joaquin Delta in California. These highly organic soils, burned to a depth of five inches every few years, have subsided six to eight feet since 1922.

Corncobs Are Being Wasted

Corn cobs, a valuable source of organic matter on the farm, are being dumped or burned daily by large milling companies. As much as four carloads a day are thrown away by some firms. If they are allowed to remain in piles until soaked by rain, then run through an ensilage cutter, they become a fine source of organic matter. The broken up corn cobs can be composted or spread on the fields after they rot in piles.

"Gopher" Plow Saves Moisture and Stops Wind Erosion

Latin American and African countries are using the "gopher" plow, produced by the Graham-Hoeme Plow Co. of Amarillo, Texas, to improve large underdeveloped areas. Advocates of the unconventional implement say it is superior to the moldboard plow because it breaks the earth without turning it and leaves stubble, grasses and other organic matter on top to serve as a mulch.

Fred Hoeme, an Oaklahoma farmer, developed the plow during the dust bowl years. He noticed that rain soaked into a portion of his field that had been crossed by a road scarifier. He made his own soil breaker by bolting curved spring-steel teeth to a transverse beam. Other dust bowl farmers soon heard of Hoeme's plow that stopped land blowing and conserved soil moisture.

In 1935, Hoeme went into partnership with W. T. Graham, a dusted-out Texas farmer, and began to produce the plow. Eventually, Graham bought out Hoeme and developed a multimillion-dollar business with a plant in Pueblo, Colo., in addition to the one in Amarillo.

The latest model of the "gopher" plow has sharp vertical disks rolling ahead of the steel teeth to chop up heavy trash. Horizontal knives (duckfee) mow down the remaining weeds.

Chinese Communists Will Not Stop Bristle Exports

Communist control of China will not cut off the American paint brush industry's supply of high quality Chinese hog bristles. Some brush manufacturers are trying to scare customers into stocking up on the top quality brushes that became scarce when the Japanese held China. The Department of Commerce is confident that a trade agreement with the Communists can be made before the three month U. S. supply of bristles is exhausted.

Farmer Killed by Parathion

Parathion, the soil-damaging insecticide, has claimed its fourth victim. William Turnage, 38 year-old Wake County, N. C., tenant farmer, died shortly after being taken ill while spraying tobacco with the deadly poison. An autopsy revealed that death was caused by "extreme congestion of the lungs, resulting in asphixia .... apparently .... due to improper use of parathion."

Following the accident, Dr. Z. P. Metcalf, head of the North Carolina state college entomology and zoology department warned that, "All insecticides are dangerous to man and animals unless properly used. Parathion and many other insecticides," he continued, "are poisonous to human beings in three ways: when breathed, when swallowed, or upon coming in contact with the skin.

"As far as can be determined in this case, the material being used was three to five times as strong as recommended. It was being applied with a mule-drawn sprayer which apparently blew the poison directly on the farmer."

Hybrid vs. Open Pollinated Corn

Ernest M. Halbleib of Halbleib Orchards writes us that he had some of his hybrid and open pollinated corn tested by the International Harvester company. "We found all hybrids lacking from six to nine minerals, including cobalt," he reports.

"Organic" Crops Withstand Frost

Fred Engle, a humus-conscious subscriber to "Organic Gardening" in Fruitport township, Michigan, watched his plants withstand 29-degree temperature one night last June while crops all around him were wiped out or severly damaged. More than 6000 tomato and 700 melon plants came thru the frost undamaged even though there was frost on their leaves.

Engle and his son Edward were known to have been fattening their soil with compost and humus for years. It is said to be one of the most fertile known in the Fruitport area.

The high moisture content of his springy soil must have had something to do with it, he says. The air over his farm was covered with mist, it was noticed. Engle also asserts that his produce raised by organic methods is more resistant to frost.

Orchard Mulches Increase Yields

Yields from cherry trees have increased 100 per cent in experiments at Michigan State College. It was done by mulching the trees with straw or legume hay, in tests by Dr. A. L. Kenworthy, horticulturist. The increase came on trees receiving only mulch and no fertilizer, as compared with trees receiving complete fertilizer and no mulch.

Water Hyacinths For the Compost Heap

Farmers of the Gulf Coastal areas should be able to obtain liberal quantities of water hyacinths, the flowering plant that clogs waterways, for use in compost heaps. Dredges have been keeping these waterways clear for the past several years, and the removed

plants probably are available for the asking.

Lately, 2,4-D has been brought into use for controlling hyacinths. If this practise becomes widespread, much potential fertilizer will be destroyed.

English Organic Farming Convinces American Visitors.

Twenty-five outstanding Midwest farmers have returned from a 16,000 mile tour of Europe enthusiastic about farming practices they saw being successfully employed in England.

R. Chester Graff, Nebraska farmer and member of the delegation sponsored by Radio Station WOW of Omaha, was agreeably surprised because he saw no erosion in England with its 40-inch annual rainfall. United Press quoted him as believing "that reasons for the lack of erosion were the slow and gentle precipitation and the practice of putting the land to grass at least two out of five years."

"One is much impressed by the English system of land resting which they call leys," Graff commented. "This is the seeding of land to grass and legumes at frequent intervals. It never is cut for hay, but is pastured so that the manure remains on the field and no fertility is lost."

Another member of the delegation, Howard Wahlgren, Nebraskan and certified seed grower, adds that "We in the United States do not fully appreciate that no straw or other coarse roughage should be burned, but that it should be restored to the soil.

† KILLING THE SOIL

By HUGH V. CORLEY

Reprinted from The Farmer (Somerset, England)

WHEN I was at school and learning biology, my form master would never allow us to use distilled water for pond life specimens. He said that as most distilled water came from copper distilling apparatus it contained very minute traces of copper and was injurious to living organisms, especially to delicate protozoa.

In my part of the world, near to the Cotswolds, there are a great many old stone roofs made with "stonesfield slats." On these grow various greyish lichens, etc., which give them their dark colour. But where a copper wire (a wireless aerial or a power cable or telephone wire) crosses such a roof there is always a clear strip of roof underneath, barren of any plant growth and showing up pale, stone-coloured against the dark of the lichen-covered parts. The reason for this is that fungi are, of all living organisms, some of the most sensitive to copper poisoning. A fungus and an alga living symbiotically together make a lichen, and a minute dose of copper is enough to destroy them.

Enough copper to be lethal to fungi reaches the roof in raindrops which have hit the copper wire in falling. When you consider how long a thin copper wire will last as a wireless aerial, there must be very little dissolved in each raindrop. Yet, it is enough.

It behooves all organic farmers and gardeners to be very careful to avoid contaminating their soils with copper salts or with copper in metallic form, as in copper nails or rifle and shotgun cartridge cases. For each lump of copper must sterilize, more or less indefinitely, a tiny patch of soil. And fungi, as we all know, are vital to a healthy soil.

STARLAND FARM GOES ORGANIC

By ALDEN STAHR

RYE grew just three inches on our farm the first year we had it; now, where organic practices have restored the soil, rich dark-green rye tickles my chin almost six feet from earth teeming with the micro-life that is natural to unplundered soil.

What wrought this change? That's the story of the Starland Organic Farm.

When Ruth and I bought our ninety-nine acres we knew absolutely nothing about farming. We had lived in the city and the suburbs, but the cocktail-tobacco existence was not for us. Our growing family made us ever more concious of health and it was a desire to provide the right place and the right food for our children and ourselves that impelled us to buy a farm.

Any farmer could have told us at first glance that the soil on our farm was depleted, but we didn't know. For that matter, it would be difficult to find a farm in our state right now which hasn't been robbed or mistreated for years. We were anxious to learn about farming from the best sources. We subscribed to every major farm magazine, read books and government bulletins, asked farmers for their advice. Typical of the advice we received were:

"Put manure and phosphate on it if you want a good pasture."

"One dressing of manure is enough for four years."

"You have to put manure on when it's hot."

"Use 5-10-5 or you won't get a crop of corn."

"We spray our fruit trees nine times a year."

Well, we planted buckwheat and gathered a magnificent harvest of weeds, with the benefit of plenty of 5-10-5. Then we tried plowing under soybeans on one field, but the soil was so poor that it produced a skinny crop and little benefit was derived. We bought some rotted manure from a neighbor but it had just been heaped outside the barn and as a result most of the nutritional elements had been either evaporated or leached away by the rain. We spread this on our pasture and added commercial fertilizer, superphosphate and lime but last summer we got only one-half wagon load of loose hay off this three-acre field and now we are in process of plowing under and sheet composting this field, as it has mostly gone to weeds.

Our row crops were faithfully fertilized with chemicals and dusted and sprayed every week but the bugs stripped whole rows of the pitifully puny plants. We had done everything we were supposed to do—this was the result.

Then I became acquainted with a soil microbiologist with whom I collaborated on an article on manure for a natual farm magazine. As he revealed to me the great world of unseen plants and animals which inhabit the soil it slowly dawned on me that there was more to farming than dirt as a vehicle for chemicals. As there are

How compost is applied on Starland Farm. The manure spreader helps to pulverize and spread the humus evenly.

How compost is applied on Starland Farm. The manure spreader helps to pulverize and spread the

good and bad people, so there are good and bad inhabitants of the soil. If human beings interfere too much with the laws of nature, indulge in excesses, they get sick. So, too, with the soil. If nature's balance is disturbed, the soil gets sick with the inevitable result—sick plants, sick animals, sick people.

Then, in doing research for the article, I came across a book by Sir Albert Howard on the relationship of soil to health and some back issues of a magazine called "Organic Gardening." Howard's material seemed a bit stuffy at first, but somehow it made sense in the light of what I had learned about the bacterial life of the soil. And the Organic Gardening issues made clear to me the necessity of returning every possible bit of waste vegetable and animal matter.

So it was that I learned the truth about farming at the corner of Fifth Avenue and Forty-second Street in New York City, in the Public Library whose crouched lions guard information which should become the agricultural bible of every farmer—how to grow bountiful and health-giving crops without spending a nickel or a moment's effort on commercial fertilizers or poison sprays. At first the method of composting seemed cumbersome to us, especially on a farm scale, so we settled for trying it on the farm garden first. The results were far beyond our expectations. We simply gave up spraying—it was too much of a bother anyway— and gave up weeding in favor of running through the garden with the cultivator once a week. We found that weeds love compost, too, but the plant food was so plentiful that we did not begrudge the weeds some, secure in the knowledge that these weeds, too, would be turned into plant food for the next crop.

Now that the value of organiculture has proved itself to us on a garden scale we're putting the whole farm on an organic basis—and as a starter gave away five hundred pounds of 5-10-5. One field at a time is being sheet composted. First we put on ten tons of pulverized limestone on ten acres, plus five tons of fine-ground phosphate rock. It took a state-wide search to get natural phosphate rock; all the fertilizer dealers had never heard of it until we located one old-timer who said, "Why, that's the stuff we used to use years ago to raise the best hay you ever saw." He kindly arranged for a superphosphate plant to grind up five tons of rock before it was adulterated with sulphuric acid and the trucker shook his head and said he'd never hauled any of that stuff before.

Thus we provided the fields with calcium, phosphorous and many trace elements and to balance the food supply we spread about twenty loads of mixed straw and manure to the acre in the winter and fall so that the straw could decompose without harming the plants. Since we have only three cows, a few pigs, sheep, steers and ducks and chickens, we naturally did not have enough manure for putting the whole farm on an organic basis. And here's the important thing for any farmer in the same boat—we went outside and bought in organic matter from every possible source. We bought three big straw stacks at an auction for five dollars and gave it to a riding stable. When this is mixed with horse manure and urine we bring it home. A neighbor was moving away, so she gave us several heaps of spoiled hay. Another neighbor boarded horses and was glad to have us haul the manure away.

In the spring and summer we compost all this material in big bins on either side of the machinery shed, which make about twenty tons of compost. And as each layer of mixed manure and straw is added, the children gather a washtub of leaves a day each from the woods and spread on the pile, plus a sprinkling of lime and phosphate rock and topsoil every eight inches.

Three small pastures are so luxuriant now that the cows and sheep can't eat it down and everyone who comes

Starland Farm draws its chief supply of organic matter from *outside* at present. Here's our "train" of wagon and spreader coming home from a riding stable a mile away. The train saves fifty per cent of the traveling time.

Starland Farm draws its chief supply of organic matter from *outside* at present. Here's our "train" of wagon and spreader coming home from a riding stable a mile away. The train saves fifty per cent of the traveling time.

This rough compost bin yields about twenty tons of compost for spreading on fields. Eight-inch layers of mixed manure and straw are interspersed with thin layers of leaves and a sprinkling of ground limestone, phosphate rock and topsoil.

up our driveway remarks on the richness of the grass and clover, which give pasturage a whole month before and a month after other pastures in this area. It shows up in the milk, too. Several neighbors' children, after drinking it, simply refuse to drink "store milk" raised with chemicals and loaded with the dead bodies of pasteurized bacteria. There is no sickness among our animals, by the way. The only time we've had the vet was when a pig had a hernia and when a heifer tore her horn on the fence.

It's a bit of a job for us to switch our farm to organiculture but it's well worth the effort to know that we're going along with nature and not fighting her. If it's financially sound for huge tea and cotton plantations to operate entirely by organic farming then it should be good business for us to do the same.

We thought we were alone in this project around here until the phone rang the other day. A voice asked, "Do you know where I can get a few tons of phosphate rock? The county agent said you had some." It was another organic farmer in the process of changing forty-three acres to organiculture and we were glad to know that there was another farmer on the right track just a few miles away, as hundreds of American farmers are doing today.

"Before and after" are together in this picture. This is winter wheat on the first of May in New Jersey grown on organically treated soil. The earth on the left has not yet been switched to organiculture and that's the best it can do.

How Lime Paid Off

HOW liming an acid soil in 1946 for cannery peas paid dividends in greatly increased hay yields in 1948 was described by M. T. Vittum of Geneva, N. Y., in a recent issue of "Farm Research."

The soil was quite acid with a pH of 4.7 in 1946. Various nitrogen and lime treatments were applied in the spring of 1946 to determine the effects of these materials on the yield and maturity of cannery peas. In the fall of 1946 the field in which the plots were located was seeded to wheat. In the spring of 1947 a hay mixture was sown in the wheat. This mixture was seeded at the rate of 3 quarts of medium red clover, 2 quarts of alsike clover, 3 quarts of timothy, and 1 pint of redtop to the acre.

After the wheat was harvested, marked differences appeared in the growth of clover on the various plots. In the spring of 1948, these differences were even more pronounced, so on June 25 small areas were harvested from some of the plots, the acre yield of air-dry hay was determined, and the percentage of the various species in the herbage estimated.

Hay Yield Doubled

Although the 2 tons of lime had no effect on peas in 1946, this treatment more than doubled the yield of mixed clover-timothy hay in 1948. Furthermore, the hay obtained from this treatment was composed of approximately 50 percent red clover and 30 percent alsike clover. The lime applied 2½ years previously increased the pH of the soil in October of 1948 from 4.9 to 5.4. This is still considerably below the pH 6.0 to 6.5 which is desirable for optimum production of most field and vegetable crops.

Ammonium sulphate, one of the more commonly used sources of nitrogen, tends to make the soil more acid. The 300 pounds of ammonium sulphate applied in 1946 theoretically requires about 340 pounds of limestone to overcome this residual acidity. A comparison of the data indicates that a big response was obtained from ammonium sulphate in 1946 because the nitrogen was the first limiting factor in the growth of the peas and the 300 pounds of ammonium sulphate applied per acre contained 60 pounds of actual nitrogen. On the other hand, because of the residual acidity, the 1948 hay yields and the percentage of clover in the hay were considerably reduced by the ammonium sulphate applied in 1946.

Neutralizing Ammonium Sulphate

Adding 500 pounds of limestone with the ammonium sulphate in 1946 slightly increased the 1946 pea yield. Furthermore, it not only overcame the reduction in 1948 hay yields caused by ammonium sulphate alone, but increased the yield of hay approximately 1,500 pounds per acre over the check.

Calcium cyanamid, another commonly used source of nitrogen, tends to make the soil less acid. The 300 pounds of cyanamid applied in 1946 has a theoretical residual alkalinity equivalent to about 190 pounds of ground limestone, and the effect of this calcium is evident from the hay yields obtained in 1948.

The data discussed above demonstrate the well-known fact that acid soils need lime for maximum efficiency in crop production. To have your soil tested for acidity, take representative samples to your county agent. He will tell you how much lime your soil needs. The lime can be applied at any time during the year, but it is suggested that part be applied before plowing and the remainder immediately after.

Editor's Note:—We do not recommend either ammonium sulphate or cyanamid. They are both artificial fertilizers. This article reprinted from *The Annapolis Valley Post Road* published in Nova Scotia.

Yarbs Are Organic

By ALDEN STAHR

"YARBS" is what a very old lady I know calls the medicinal plants she has used for years to cure her "misery." And all over this country of ours herbs of many kinds are still in family use—witch hazel twigs and leaves, boneset, sassafras tea, goldenseal, and maypop or passion flower, which, belying its name, is used as a sedative.

These and other simple home remedies have won such wide-spread use by drug manufacturers that now more than ten million pounds of leaves, roots, bark and stems of drug-bearing plants are harvested each year by farmers and their families. The medicinal value of these plants is due in large part to the fact that they are raised in a state of nature and thus are organically grown. Attempts to raise most of the drug plants usually meet with failure because nature is violated when commercial fertilizers are used and the medicinal content drops to a worthless amount.

Quite a few farmers and their families do, however, add to their cash income by gathering wild drug plants in the woods and fields, and the Department of Agriculture has put out a booklet called "American Medicinal Plants of Commercial Importance" (Misc. pub. No. 77) which pictures many of these drug plants, tells where they are found, the part of the plant used for drug purposes and the estimated demand. In this booklet you find such wonderful native names as aiten, gorst and hackmatack (juniper), "doon-head-clock" (dandelion), "Nature's Mistake" (dogwood), and saloop (sassafras) among many others.

Although some of the hundreds of plants described may be found anywhere in the United States, most of the crude drugs used commercially come from the "Blue Ridge" country in the mountains of North Carolina. In this region more than two hundred botanical drugs in active demand are gathered by farmers and hill folk and and sold to the three gathering depots maintained by S. B. Penick & Co., world's largest botanical drug house. This company issues bulletins on the first of each month to fifteen hundred natives, giving instructions for the gathering of plants and establishing prices for the following month. Quantities brought to the depots range from a few pounds of herbs, roots and barks to ton lots, and here these materials are graded, weighed and paid for, with a bonus often paid for re-washed roots or specially selected leaves.

According to Penick, "the establishment of prices paid to gatherers is a delicately adjusted affair. The final arbiter is supply and demand. If prices are set too high, overproduction and losses result, if too low there is an insufficient supply and prices advance. It might seem that all that is necessary is to discover a right price to bring out a sufficient collection and the work would be done once and for all. This would be true were it not for the many factors to be considered. Peculiarly enough, Nature's wild crops vary widely and unaccountably from season to season and only through long experience and a thorough knowledge of the varying conditions is it possible to foresee the approximate production and demand and establish the right price to assure an ample supply. It frequently happens that a small locality has been the chief source of supply of some important drug for years. The output gradually diminishes until an adequate supply from this source can no longer be obtained, and it becomes apparent that a new center of production must be found and developed. This problem falls upon our Asheville collection house and through the use of accurate photographs of the plant in question combined with thousands of circulars giving full information relative to gathering and the prices paid, new and satisfactory sources are opened."

Despite this concentration in North Carolina, many important American botanical plants are produced in other parts of the country. For example,

senega is produced in the northwest and four and a half million pounds of cascara come from the Pacific Coast each year.

Aware of the need for developing new sources of plants as wild sources fail and also recognizing the possibility of successful cultivation of many drug plants now grown wild, Penick and Company have established a "pilot farm" near Reading, Pennsylvania. Here, soil scientists are working out the best methods of cultivating wild plants. Surveys include agronomy, plant selection and breeding, greenhouse forcing and the control of fungi and diseases. This scientific exploration will also include study of the best seasons and methods of harvesting and curing and it is expected that this pilot farm will serve as a go-between, helping drug manufacturers to overcome diminishing supplies of wild drug plants by developing methods for farmers, so they may supply the needed drug plants commercially and profitably.

S. B. Penick and Co. may be reached at 50 Church St., New York, N. Y.

❖

Non-Legume "Rest" Insures Good Alfalfa

Where alfalfa has run out of a field, it may be reseeded after two or three years provided non-legume crops are grown during the interval before the return to alfalfa, says R. C. Thomas, plant pathologist at the Ohio Agricultural Experiment Station. Such crops should be those which require clean cultivation.

Examination of seedings three years old and older, and sometimes of those less than one year old, reveals that nodule formation has been below normal. The same is true even to a greater degree where old stands have been reseeded. Plants grow well for a time, then begin to die, with few nodules formed.*

Nodule formation on the roots seems to be associated with the normal growth of legumes.* Anything which inhibits or inteferes with this process must be a limiting factor. Such a physiological disturbance of normal growth may be considered a disease in which the growth of the legume is interfered with to such an extent that crop failure results.

J. I. RODALE *says about:*

Make Friends With Your Land

by **LEONARD WICKENDEN**

"It's the most readable book yet written in the field of organic farming and gardening. Written by a practicing consulting chemist, it covers technical ground in a manner surprisingly easy to read and to enjoy. It strikes the final knock-out blow to the concept that chemical fertilizers are in any manner good for crops and soil.

Wickenden was a skeptic. His book, *just off the press,* shows how scientific investigation made him a convert. Arm yourself with the ammunition he provides in support of organicultural methods.

Illustrated. 144 p. Price **$2.50**

THE ORGANIC FARMER
Dept. OF-9W, Emmaus, Pa.

THE ONLY KNOWN SCIENTIFIC METHOD OF MIXING ORGANIC MATTER WITH THE SOIL
Models to meet your needs . .
ARIENS TILLER
The exclusive features of Ariens Tiller — the original all-American, all-purpose tilling and cultivating combine backed by 18 years successful experience — put it in a class by itself for your purpose. Complete details upon request. Write
ARIENS COMPANY-BRILLION, WIS.

BOOKS for Organic Farmers

Farmers of Forty Centuries

by F. H. King

Dr. King takes his readers into the fields of Japan and China to observe at first hand the agricultural practices which enabled those peoples to maintain their soils in a highly productive condition over a period of forty centuries. Cloth, 384 pp., 209 photographs. **$5.00.**

•

Bio-Dynamic Farming and Gardening

by Dr. Ehrenfried Pfeiffer

Describes in full the bio-dynamic methods for converting an ordinary farm into a bio-dynamic farm. Paper, 240 pp., 18 illus. **$1.75.**

•

An Agricultural Testament

by Sir Albert Howard, C.I.E.

The standard textbook for farmers and gardeners who want to change from ordinary chemicals to home-made organic fertilizer. Cloth, 253 pp. **$3.50.**

•

The Earth's Green Carpet

by Louise E. Howard

Lady Howard, widow of Sir Albert Howard, shows that degenerative diseases are on the increase as a result of soil depletion by artificial chemical fertilizers. She stresses that Man's health and happiness depend upon the use he makes of "the earth's green carpet." Cloth, 260 pp. **$3.00.**

•

Grow a Garden

by Dr. Ehrenfried Pfeiffer

A goldmine of information for growing each vegetable from the bio-dynamic point of view. Paper, 118 pp. **$1.40.**

•

Memoirs of a Rose Man

by J. Horace McFarland

Contains the horticultural ideas and personal reminiscences of America's greatest champion of the rose. Preface by L. H. Bailey, introduction by R. C. Allen, biographical sketch by Robert Rodale. Cloth, 160 pp., many full-page photos. **$3.00.**

The Earth's Face and Human Destiny

by Dr. Ehrenfried Pfeiffer

A beautiful landscape is an index of a living soil which has not been exposed to bad agricultural practices. The author warns his readers against measures which surely lead to the deterioration of our fertile soils. Cloth, 183 pp., 60 illus. Frontispiece in color. **$2.75.**

•

The Soil and Health

by Sir Albert Howard, C.I.E.

Food problems can be solved only by restoring to the soil its virginal fertility. Man has been and still is an exploiter, and most farmers are soil bandits. A remarkable follow-up to "An Agricultural Testament". Cloth, 320 pp. **$4.00.**

•

The Compost Gardener

by F. C. King

An English gardener explains his system of organic gardening. Foreword by Sir Albert Howard. **$1.00.**

•

The Pruning Book

by Gustave L. Wittrock

This is definitely a book for the home gardener, an expert tree pruner always by your side. It deals with all kinds of shrubs and trees, tells not only *how* to prune, but *when*. Cloth, 166 pp. **$3.00.**

•

Trees and Toadstools

by M. C. Rayner, D.Sc.

Deals with the fundamental but little understood relationship between the toadstools which grow in the forest floor and the giant trees which tower high over the other woodland plants. Cloth, 122 pp., 18 full-page photographs. **$2.50.**

•

Earthworms—Their Intensive Propagation

by Dr. Thomas J. Barrett

Complete, practical working directions for breeding, feeding, growing, and harvesting man's most important soil-builder. 6th large printing. Paper, 60 pp. **$1.00.**

Order from* THE ORGANIC FARMER, Dept. OF 9A, *Emmaus, Pa.

Livestock....

Feeding Cobs To Steers

If you don't have enough pasture, hay or corn and you're not too interested in getting premium steers to market quickly, you can feel safe in throwing some extra cobs in your corn-and-cob meal. Full grown steers in the lower grades will be able to take the most cobs and still finish in in their grade.

To make extra cob meal, just double the amount of cobs used in normal meal. You may have to add some molasses until the cattle get used to the new feed. Feed the greatest amount of cobs at the beginning of the finishing period, tapering off as marketing time approaches. Be sure to feed a few pounds of alfalfa every day to supply vitamin A.

Water-Not Chlorine for Washing Udders

Experiments recently conducted at the Pennsylvania Experimental Station prove that chlorine and ammonia solutions are not necessary for washing cows' udders before milking. Udders of cows that were washed with water alone showed the same bacterial plate count as udders that were washed with chlorine solutions (200 and 400 ppm) and with quaternary ammonia solutions (200 and 400 ppm). Udders should be washed thoroughly with clean water before milking.

Experiments at the station also showed that leaving the milking machine on for more than 10 minutes is very injurious to the lining of the cow's teats. Five minutes of milking did not hurt the cows, but serious injury may be produced between five and ten minutes or longer.

M-E ROTARY TILLAGE MULCHES VEGETATION INTO SEED BED...

4 or 6 sets on each Patented Tine Unit

Power Take-Off Models Also Available

AERATES SOIL... LEAVES IT HUMUS

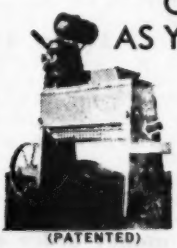
Use it spring, summer, and fall to rebuild soil Nature's way by cutting and mulching vegetation throughout tilled depth. This aerates soil, leaves it humus, improves moisture and mineral content, requires less fertilizer. And M-E Rotary Tillers have extra mechanical advantages: 4-cycle engines on all garden models..no tine breakage .. precision-built. Ask your dealer for free demonstration or write today.

Patents Pending

Milwaukee Equipment Mfg. Co.
Dept. OF-8 South Milwaukee, Wis.
Please send me illustrated folder, prices, and name of nearest M-E Rotary Tiller dealer.
Name.....
Address.....

M-E ROTARY TILLERS
MILWAUKEE EQUIP MFG CO
So Milwaukee Wis U S A

Copyright 1949 Milwaukee Equipment Manufacturing Co.



COMPOST AS YOU WANT IT

- ..SCREENED
- ..SHREDDED
- ..GROUND
- ..MIXED

(PATENTED) Rocks, trash separated. Grinds manure and tough organic matter through rolling screens, wet or dry. Screens fine as wanted through perforated screens. Free compost circular.

W-W GRINDER CORP. Dept. B WICHITA, KANSAS

Subscribe to The Organic Farmer

A NEW MAGAZINE devoted to the Organic Method on the farm. Every issue carries practical illustrated articles showing how to get better crops by doing away with artificial fertilizers and enriching the soil with organic matter.

The organic method enables a tremendous reduction in the use of poison sprays, possibly eliminating them altogether! Read *how.*

Issued every month, this attractive 64-page magazine will keep you up-to-date on natural, *successful* farming methods. Far-sighted growers tell their amazing experiences of improved, more healthful crops *raised at lower costs.*

With each subscription is given a full copy of the new 64-page book, "The Organic Method on the Farm."

THE ORGANIC FARMER, Dept. OF8
EMMAUS, PENNSYLVANIA

Start my subscription immediately and bill me for

☐ 1 year, $3 ☐ 2 years, $5 ☐ 3 years, $6

Name .....

Address .....

.....

(Please write clearly)

☐ Check or money order enclosed. Send me FREE your new 64-page book, *The Organic Method on the Farm.*

Guiding Sheep Without a Crook

After collecting the sheep, suddenly stoop and embrace the neck of the wanted sheep from the underside with the left arm and hand, allowing the throat and brisket to rest on the wrist and forearm. At the same time take hold of a handful of wool in the rear off side buttock. If you want the sheep to go forward, pull the wool—a whole handful of it—lightly with the right hand while completely easing the pressure of the left hand and arm at the front. If you want the sheep to halt or go backwards, reverse the procedure, holding the wool and exerting pressure with the left hand and arm while easing the pull and pressure of the right hand.

Poultry....

Egg Collections

The number of cracked and broken eggs can be reduced by making two egg collections in the morning, one around 9:30 and the other about noon. Seventy to eighty per cent of egg production takes place before 11 A.M.

Turkeys On Stones

You can get away from raising turkeys on wire by covering your yard with small stones. Droppings are washed off the stones with each rain and birds do well despite the rough footing. Turkeys raised by this method seldom get blackhead. From time to time more stones must be added to replace those that wash into the ground.

More About Turkeys

Ground corn cobs makes a foolproof turkey nesting material because it always rolls back into place if the hens try to scratch it away. Loss from hatching egg breakage in the nest can be cut down considerably.

NUTRITION & THE SOIL

Thoughts on Feeding

by DR. LIONEL PICTON, O.B.E.

with an Introductory Essay on Creative Medicine by

DR. JONATHAN FORMAN, F.A.C.A.

Everybody eats. Everybody should know *what* he eats. Is the food of today fit to eat, or has mass production and processing made it synthetic—lacking in minerals, vitamins and other health-building elements?

In the U.S.A.—the world's best-fed nation—chronic illnesses and deficiency diseases are on the increase; mental illness and nervous disorders have become a frightening problem; half the population (judging by Army examination standards) is way below par; "one in 8 will die of cancer" etc., etc., etc.

With farmers plagued by every known plant and animal disease (mostly deficiency diseases) and ever-increasing swarms of pests, isn't it reasonable to say that a great deal must be wrong in the way our crops are grown?

Dr. Lionel Picton, one of England's greatest experts in the fields of nutrition and public health, came to the conclusion, arrived at from a lifetime of observation and testing, that *nourishing food can only come from crops and animals raised on organically fertilized soils*—a conclusion which should startle anyone familiar with modern food production methods. He gives his evidence for this sobering doctrine in *Nutrition & The Soil.*

Dr. Jonathan Forman, Editor of the *Ohio State Medical Journal* and vice president of Friends of the Land, an American pioneer in nutrition and soil relationships, has written a challenging essay by way of introduction to Dr. Picton's work.

NUTRITION & THE SOIL should be read by every doctor and farmer and gardener in the land. What Dr. Picton and Dr. Forman have to say cannot be laughed off. Bigger and bigger hospitals, national clinic programs, etc., are only a part of the answer to our vast sickness problems. *Nourishing* food is basic. And "the soil is the source of life"—what happens there is of the utmost importance to us all.

Cloth, illustrated, 5½x8, 400 pages, **$4.00.**

Order from ORGANIC FARMER, Dept. OF-9P, Emmaus, Pa.

SPEARIN CHICKS

DOUBLE-SURE SUCCESS with my ROCK-HAMP HEAVY Barred CROSS

1. They grow fast, feather quickly and make quality broilers.
2. The pullets are dependable producers of good brown eggs, and are meaty and marketable at the end of the season.

You can't go wrong on this Barred Cross. Try it!

Write for Fall Prices and Folder

WALTER SPEARIN

Box F, Salisbury, Md.

Md.-U. S. Approved and Pullorum Clean

Surplus Chicks $7-100 C.O.D.

New Hampshires, Barred Rocks, White Rocks and Heavy Assorted, as hatched or cockerels. Specify when ordering. 25-$3.00; 50-$5.50; 100-$7.00. Prices at Hatchery. A. F. HOCKMAN, R. 10, Bellefonte, Pa.

Premier Handy Bale of

PEAT MOSS

A generous size Bale packed in veneer

$3.75 f.o.b. our Nursery

HEMLOCK HILL FARM

"The Mountain Valley Nursery"

NEW PARIS, PENNSYLVANIA

Write for our Fall catalog of high quality Holland bulbs. We import directly from one of the best growers in Holland.

"SOILUTION"

The name describes the Hybrid Earthworm developed expressly for use in Gardens, Compost and Soil Improvement.

GET the BEST!

Descriptive Literature on Request.

Colorado **Earthworm Hatchery**

2134 Decatur St. Denver 11, Colorado

Domesticated

EARTHWORMS

Nature's soil conditioner for bigger and better crops.

Write for literature.

ROMAC EARTHWORM FARM

Box 375 Ashland, Ohio

SCOOP USED TO MOVE MANURE

Reprinted from "Mother Earth"

FARMERS who are deterred from compost-making by the amount of labor involved may be interested in the following information and photographs, supplied by the Department of Agriculture of Pretoria, Union of South Africa. These first appeared as an article in "Farming in South Africa," August 1943, by J. D. Scott, Officer in Charge, Estcourt and Tabamhlope Research Stations, Division of Soil and Velt Conservation, and have been issued as a leaflet.

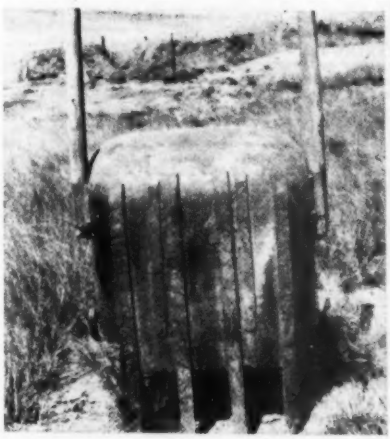
At the above stations, large quantities of farmyard manure are made each winter in kraals (yards) for subsequent composting; and, as in this country, the removal of this material after it has been trodden into solid mass by cattle is a heavy and tedious job for hand labor. A dam scoop was tried, but it did not penetrate and it had to be adapted.

"Four iron bands, two inches wide and half-inch thick, sharpened to a point, were riveted under the scoop. The two middle ones projected about 11¾" and the two outer ones 10 inches in front of the scoop.

These sharpened bars penetrated the mixture on the kraal floor easily, and it was possible for two boys to remove all the material, with two oxen drawing the scoop. As the passage of the oxen over a heap would have consolidated it too much, the compost material was dumped outside the kraal, where two other boys packed it into heaps.

This improved instrument has cut down the cost of compost-making at Estcourt enormously. Two boys with two big oxen in this scoop took the

compost material out of the kraal at the rate of just under nineteen tons per day (one cubic yard at 70 per cent moisture weighs approximately



A dam scoop set up to handle manure by South African composters.

half a ton) and, with two boys packing it into heaps, it was possible to build a stack 25 by 18 by 4½ feet in two days."

The cost of adapting the scoop, adds Mr. Scott, was only $8.50. It might well be less here, and since the bars act as shoes, the working life of the scoop is considerably increased.

BARNYARD GOLD

Convert manure to great Soil Building Fertilizer (completely balanced) simply by adding Ruhm Phosphate Rock (30% phosphoric)—just sprinkle regularly on the accumulating manure in pits—or sprinkle daily in barn stalls, gutters, on poultry dropping boards etc. Widely used also for direct application to soil. Apply Now. "Don't Put It Off—Put It On". Note—Ruhm Phosphate is a raw finely ground phosphate rock. A natural mined product. The kind used by America's largest farms because of its not being harmful to soil organisms. Priced $32.80 per ton f.o.b. Townsend, Mass. Farmer Agencies Open: Write for particulars to Mr. Daly.

•

GRO * POWR

For real organic farmers—who realize that the more compost they make, the better truck gardens they'll have!

Get a big supply of ACTIVO in the economical sizes plus what you need in pulverized limestone, rock phosphate, etc.

☐ No. 50 size ActivO (for 6½ tons waste) and a 100 lb. bag of the finest ground Ruhm Phosphate (regularly $2.75) — together for $13.95 shipped freight collect. Write for our literature and new price list of about sixty organic materials. We carry in stock more different organic materials **and that is why we are called**

ORGANIC SOILSERVICE HEADQUARTERS

TOWNSEND **MASS.**

KETAY'S Chicks

LIVE-LAY-PAY

Finest New England stock, specialized breeding program, expert incubation, guaranteed to live.

U. S. PULLORUM CLEAN

- **Red-Rock "Black" Pullets**
- **Rock-Hamp Broiler Cross**
- **Straight New Hampshires**
- **R. I. Reds and Leghorns**

FREE folder, prices, Guarantee

KETAY'S HATCHERY, Box F

Huntington Station, N. Y.

Largest Chick Producers in N. Y. State

WORMS THAT SQUIRM

. . . are the most active worms known. The bustling activity of these vigorous plowmen is just what you need to complete your organic program. Nature's compost makers give you the NPK formula which Nature intended for your soil.

Let WORMS THAT SQUIRM work for you—168 hours per week—in your soil, your compost heap, or your garbage disposal pit.

Write for literature and prices

BIOS EARTHWORM HATCHERY

1531 Broadway **Boulder, Colorado**

ORGANIC GARDENING

The Perfect Gardening Magazine for you

Many ORGANIC FARMER subscribers have read **ORGANIC GARDENING** at some time in the past and know its value as a gardening magazine. Articles in **ORGANIC GARDENING** are written to appeal to all who have an interest in flower and vegetable growing. As all publications of Rodale Press, **ORGANIC GARDENING** is devoted exclusively to the organic method and is prepared especially for home gardeners, orchardists, and flower growers who want to stay as close to Nature as possible in their horticultural practices.

ORGANIC GARDENING was established in 1942 with 28 subscribers, and has risen among the ranks of garden magazines to a total subscription of over 100,000. This we believe indicates that the organic method is here to stay, and that **ORGANIC GARDENING** is rapidly becoming the outstanding gardening magazine in America.

ORGANIC GARDENING is undergoing a complete change in January, 1950. These changes are calculated to bring you a magazine of which you may be proud. These changes include:

- ***Increase in size to 8⅜" x 11".***
- ***Introduction of beautiful four color covers.***
- ***Enlarged editorial content.***
- ***Added feature articles for the subscribers interest.***
- ***Many other additions that will make* ORGANIC GARDENING *your best magazine buy.***

Each enlarged 64-page issue of **ORGANIC GARDENING** will be filled with thrilling and informative articles for everyone.

Subscribe now, so that you won't miss the next issue of **ORGANIC GARDENING.** Send $3.00 for one year, $5.00 for two years, or $6.00 for three years. Send check, money order, or ask us to bill you. **Act today.**

ORGANIC GARDENING
Dept. OF-9G, Emmaus, Pa.

Classified Ads

Rates are 6c a word. Minimum 25 words, or $1.50. Payable in advance. Include name and address in word count.

EARTHWORMS

NEW ENGLAND ACCLIMATED Soilution Earthworms. Selection of egg capsules, baby worms, and breeders; pint $1.75 postpaid. Instructions with each order. **GRANITE STATE EARTHWORM HATCHERY, 491 Hall Street, Manchester, N. H.**

PROPER BALANCE MAKES PERFECT RESULTS. Write NOW for information and most unusual 'ONCE A YEAR OFFER'. **VIRGINIA EARTHWORM FARM, Cherry Hill, Route 4, Roanoke, Virginia.**

WORM-ACTIVATED COMPOST MADE POTATOES at rate of 29,972 pounds per acre for us this year, other truck in proportion. Farming without earthworms means lessened production. Start with the right kind for right results. We've bred the Dr. Oliver kind 15 years. Prices right. Circulars. Stamp, please. **CALDWELL, Barwick, Georgia.**

TOPSOILER EARTHWORMS. Dr. Oliver's Hybrids. Creators of natural humus. Earthworms build topsoil. The more "TOPSOILERS", the greater soil fertility. Free folder. **TOPSOILERS, 13243 Mark Twain, Detroit 27, Michigan.**

EARTHWORMS. Save on Fertilizer cost. Follow Nature's Way. For Soil Building and Better Composting. Write for descriptive folder. **COOLVILLE EARTHWORM FARM, Coolville 2, Ohio.**

Famous SOILUTION Domesticated EARTHWORMS for soil building, fish bait and poultry tonic. Hand selected. 500—$5.00, 200—$2.00. Complete instructions. **NATURE'S SOIL BUILDERS, 1544 Spring Garden, Lakewood, 7, Ohio.**

Order EARTHWORMS NOW. Nature's fertilizer for building good soil 100-$1, 250-$2.00, 500-$4.00. Free information and culture. **EDMONDSON HATCHERY, 118 Mirabeau, Greenfield, Ohio.**

EARTHWORMS—Use that famous earthworm developed by the late Dr. Oliver. Herbert Clarence White, writer for Organic Gardening, swears by them. Write for folder. **MIAMI VALLEY EARTHWORM FARM, 109 E. Beechwood Ave., Dayton 5, Ohio.**

"HARNESSING THE EARTHWORM". Get this informative and authoritative book. Gripping life story of the author, "An Earthworm Turned His Life", mailed free. Write **DR. THOS. J. BARRETT, Dept. 49, Sun Valley, Calif.**

FOR DOMESTICATED EARTHWORMS to build your garbage and waste materials into organic rich soil call or write **Mrs. L. JONES, 1515 E. 76th, Seattle, 5, Wash.**

"SOILMASTER EARTHWORMS" produce humus for better gardens, flowers, lawns. Bait. Prices you can afford to pay. Write **R. H. McNEAL, Box 110, La Junta, Colorado.**

FLOWERS

DOWN THE DAFFODIL PATH; uses the new RHS Narcissus classification in the 1949 catalog listing 150 of the finest and newest varieties of Daffodils, at popular prices. **EMELENE M. COLE, Coos Bay, Oregon.**

IRIS—10 Beautiful Iris labeled including Wabash, $2.00, postpaid. Catalog Iris and Daylilies free. **SUNSET VIEW IRIS GARDENS, Constantine, Michigan.**

FOODS

HONEY (Primeval) Finest you ever tasted, or money refunded immediately. Primevally gathered by our bees in woods and wild, where no chemicals are used. Primeval Wild Flower, or Wild Buckwheat Honey, same price. Comb Honey (Clover): 3 sections $2.50; 6 sections $4.75. All prepaid 3d. zone against check. C.O.D. plus postage. **SMITHTOWN BEE FARM, Turnpike, Smithtown, N. Y.**

FOR SALE, 200 bushels of Bio-Dynamic grown wheat. **E. FETZER, New Hope, Pa.**

FARMS FOR SALE

FIFTEEN ORGANIC ACRES. 6 room house. Modern conveniences. Barn, other buildings . Driven well. Orchard. Plenty composting material on hand. Wonderful opportunity energetic, imaginative couple fond animals. Owners moving West. Immediate cash sale—sacrifice—$9750. Also available foundation herds pure-bred, pedigreed. Toggenburg goats and rabbits. **WALKER, Rhinebeck, N. Y.**

The Trend is THE ORGANIC WAY

These Organic Farming Booklets show you the *Why* and *How*

1.—**THE DOCTORS' ATTITUDE TOWARD FERTILIZERS.** What they think of the organic method. Contains a transcript from a U. S. Senate Hearing. 60c

2.—**MANUAL OF ORGANIC MATERIALS. A Comprehensive List of Compostable Materials Occurring in the Home and in Industry.** This book alphabetically lists 85 substances that may be used to keep the soil fertile in Nature's way. It defines the composition of each material and what each substance contributes in plant nutrients to the soil. . . 50c

3.—**BULBS AND HOUSE PLANTS** by Cecile Hulse Matschat. Discusses tulips, iris, lilies, peonies, etc. 60c

4.—**ANNUALS AND PERENNIALS** by Cecile Hulse Matschat. Describes the advantages of annuals over perennials and vice-versa. . . 60c

5.—**HOUSE AND GREENHOUSE GARDENING** by Fred McReady. Deals with inexpensive means for growing plants in your house and under glass in hot-beds and greenhouses. . . . $1.00

6.—**GARDENING WITH THE EXPERTS** by Garden Experts. An encyclopedia on all phases of gardening. $1.00

7.—**THE WAR IN THE SOIL** by Sir Albert Howard, C.I.E., M.A. A magnificent summary of the organic cause for those who desire to change from ordinary to home-made organic fertilizer. . . 80c

8.—**SEEDLINGS** by Evelyn Speiden. How to start seedlings—how to prepare the garden. . . $1.00

9.—**VEST-POCKET VEGETABLE GUIDE** by Roger W. Smith. How to grow 60 vegetables in the organic manner—for medium northern climate. . 25c

10.—**COMPLETE MODERN GARDEN HERBAL** by Robert O. Barlow. Many facts about herb gardening and usage in several lands. . . . $1.00

11.—**THE FRUIT ORCHARD** edited by J. I. Rodale. Practical hints, unusual data on fruit growing. 50c

12.—**LEAVES AND WHAT THEY DO** by Heinrich Meyer. For every gardener and lover of plants. . 45c

13.—**SUNFLOWER SEED—THE MIRACLE FOOD** by J. I. Rodale. Treatise on how to grow, how to eat this vitamin-rich food. 50c

14.—**WEEDS AND WHAT THEY TELL** by Ehrenfried Pfeiffer. Discusses hundreds of weeds common to farm, orchard and garden. . . $1.00

15.—**SHRUBS AND TREES** by Cecile Hulse Matschat. Landscape design, borders and backgrounds, street trees, flowering trees, fruit trees, evergreens, etc. 60c

16.—**HOW TO MAKE A GARDEN** by Cecile Hulse Matschat. Here are all the facts and underlying principles to make any garden a success. Illustrated. . 65c

17.—**PLANNING THE HOME GROUNDS** by Cecile Hulse Matschat. Whether you buy or build . . . remodel or start from the ground up, this book will help you develop a beautiful setting for your home. . 65c

18.—**HOUSE PLANTS—How To Grow Them** by P. T. Barnes. A complete guide for growing healthy vigorous plants in the house. . . 50c

19.—**TEN TRUSTWORTHY TROPICAL TREES** by John C. Gifford. A delightful book. Includes the lime, cocoanut, guava, avocado and mango. . . $1.00

20.—**WILD GARDENS OF NEW ENGLAND** by Walter Prichard Eaton. How to reproduce the natural settings of lovely, wild flowers in your garden. $1.00

21.—**GARDENING FOR PROFIT** by Peter Henderson. Originally published in 1874. Reveals many profitable secrets for present-day gardeners. . . $1.00

22.—**QUICK-RETURN METHOD OF COMPOST-MAKING** by Maye E. Bruce. New ideas for producing compost WITH OR WITHOUT animal manure. . $1.00

23.—**TREE CROPS** by J. Russell Smith. An inspiring book on trees yielding crops as animal food. . 75c

24.—**EDIBLE PLANTS OF THE POND AND WATER GARDEN** by G. L. Wittrock. A wonderful instructor for the nature-lover and fisherman. . 50c

25.—**THE FORMATION OF VEGETABLE MOLD THROUGH THE ACTION OF WORMS** by Charles Darwin. Contains the most important parts of his classic on the earthworm, with other articles. 60c

26.—**OUR FRIEND THE EARTHWORM** by George S. Oliver. Deals with the importance of the earthworm to gardening. Truly a friend to man. $1.00

27.—**ANIMALS AND THE GARDENER** by Richard Headstrom. Animals and insects that are friends and foes to the garden. 35c

28.—**LUTHER BURBANK** by Roger W. Smith. Interesting reading about plant breeding and the important contributions of this great horticultural pioneer. 35c

29.—**QUESTIONS AND ANSWERS ON COMPOST** edited by J. I. Rodale and Heinrich Meyer. A guide for compost-making. 35c

30.—**COMPOST—HOW TO MAKE IT** edited by J. I. Rodale. The only book of its kind ever published. 35c

31.—**SLEEP AND RHEUMATISM** by J. I. Rodale. Explains simple rules for avoiding stubborn conditions of neuritis caused by pressures exerted during sleep. 35c

32.—**NATURAL BREAD** edited by J. I. Rodale. Discusses health-giving values of breads and cereals made with organically-produced stone-ground grains. . 35c

33.—**DEBATES IN HOUSE OF LORDS.** Deals with the advisability of forming a Royal Commission to check on the Sir Albert Howard method of farming . 45c

35.—**FLOWERS FOR EVERYONE** by Heinrich Meyer. Facts about the common plants of the garden. 40c

36.—**THE GARDEN NOTEBOOK** by Alfred Putz and J. W. Johnson. Proper methods and practices for all types of gardening. . . . $1.25

37.—**THE GLADIOLUS BOOK** by William M. Jokl. All about the gladiolus and its culture. . . $1.00

38.—**THE BERRY BOOK** by M. B. Cummings, PhD. If you grow, or intend to grow, berries, this book is worthy of your attention. . . 80c

39.—**FLOWER CALENDAR** by Dr. William H. Eyster. This calendar tells what to plant and when to do it. Assures a blooming, beautiful garden all year. $1.00

40.—**THE VEGETABLE CALENDAR** by Dr. William H. Eyster. Climate maps and extensive tables enhance the value of this month-by-month chart of preparation, sowing, and harvesting. . $1.00

41.—**THE ORGANIC METHOD ON THE FARM** by J. I. Rodale. Large-scale composting; odorless, laborless chicken-house; field crops and orchards. . $1.00

Send your order today direct to THE ORGANIC FARMER, Emmaus, Pennsylvania

Canada and Foreign add 10% for Shipping Charges

ORGANIC WAYS CHANGE 750 "WORTHLESS" ACRES INTO RICH FARMLAND

Successful Grower Tells Whole Story in New Rodale Book, "HUMUS AND THE FARMER"

HERE is the true and fascinating story of a large farm successfully operated according to organic methods. With graphic descriptions, fully illustrated, recommendations are given for the making of pastures, reclamation of waste or derelict lands, and increasing the water-holding capacity and productivity of the soil. The value of mixed farming and reforestation, the importance of the earthworm, and the mechanization of the compost method are all clearly explained in *Humus and The Farmer*, just published by Rodale Press.

It all began when what was regarded as one of the best herds in England proved, upon government inspection, to be 66% diseased—the result of deficiencies in the food plants. The herd was dispersed and the valuable farm land sold. Friend Sykes then purchased 750 acres of land on the Salisbury Plain which farmers round about considered practically worthless. He subsoiled it and fertilized with natural manures exclusively. Pasture and crop plants were grown which were rich in minerals and other nutrient materials. As a result, the cattle and horses were maintained in such health and vigor as had been hitherto unknown, and the land is now eagerly visited by outstanding agriculturists as one of the most interesting farms in the country.

Prize Galloway Matron, Elsie II (from "Humus and the Farmer")

Artificials Uneconomical

In his valuable, exciting book, *Humus and The Farmer*, Mr. Sykes places his essential acts of good farming in the following order of importance: (1) the four-year pasture, (2) good c tivation, including subsoiling, (organic manuring through grazing of stock, and (4) co posting. The details he gives some of his scientific records the farm are startling in th originality and intriguing their indication of the ine quacy of orthodox methods.

In discussing the organic me od with present-day agro mists, the latter invariably the discussion by saying the ideal method of fertiliza of the soil includes the use plenty of both organic and a ficial fertilizers. This is a d cult argument to refute, but Sykes deals with it convincin and gives comparative figure show the financial disadvant of adding any artificials wh ever to adequate organic nuring. The author foresee dark future for agriculture present practices are long c tinued.

Tripoding clover for seed (from "Humus and the Farmer")

Order today from

416 pages..40 photos..$4

THE ORGANIC FARMER, Dept. O.F.9-H, Emmaus, Penna.

4 / 52 STR 5900
U.S. DEPT. OF AGRICULTURE
LIBRARY
WASHINGTON 25 D C